

13-AMRP-0148

# Department of Energy

Richland Operations Office P.O. Box 550 Richland, Washington 99352

APR 0 4 2013

Mr. D. A. Faulk, Program Manager Office of Environmental Cleanup Hanford Project Office U.S. Environmental Protection Agency 309 Bradley Boulevard, Suite 115 Richland, Washington 99352

Dear Mr. Faulk:

TRANSMITTAL OF APPROVED WASTE SITE RECLASSIFICATION FORM NO. 2013-006 AND SUPPORTING DOCUMENTATION FOR THE 300-32 WASTE SITE, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2013-006 and supporting, "Remaining Sites Verification Package for the 300-32 Waste Site," Rev. 0. If you have questions, please contact me or your staff may contact Rudy Guercia, of my staff, at (509) 376-5494.

Sincerely,

Mark S. French, Federal Project Director for the River Corridor Closure Project

AMRC:RFG

Attachment

cc w/attach:

L. E. Gadbois, EPA

Administrative Record, H6-08 (300-FF-2 OU)

cc w/o attach:

S. L. Feaster, WCH

T. Q. Howell, WCH

D. L. Plung, WCH

J. P. Shearer, CHPRC

G. B. Snow, WCH

C. P. Strand, WCH

WASTE SITE RECL	ASSIFICATION FORM
Operable Unit: 300-FF-2 Waste Site Code(s)/Subsite Code(s): 300-32	Control No.: 2013-006
Reclassification Category: Interim  Final Final Reclassification Status: Closed Out  RCRA Postclosure  Approvals Needed: DOE  Ecology	No Action
Description of current waste site condition:	
waste site is the footprint of the former 333 Building located Hanford Site. The 300-32 waste site was included as a cand 300-FF-2 Operable Unit Interim Remedial Action Record of Seattle, Washington (EPA 2009). Demolition of the 333 Buil September 2006. The 333 Building slab with press pit was a Confirmatory sampling at the 300-32 waste site was perform results indicated that additional remediation was required at (TPH) analyses exceeding the direct exposure clean up level confirmatory focused sample location 15, with additional remediation. Verification sampling of the re-excavated area was a site of the sample of the re-excavated area was a site of the sample of the re-excavated area was a sample of the sample of the re-excavated area was a site of the sample of the re-excavated area was a sample of the sample of the re-excavated area was a sample of the sample of the re-excavated area was a sample of the sample of the re-excavated area was a sample of the re-excavated area.	didate site in the Explanation of Significant Differences for the Decision, U.S. Environmental Protection Agency, Region 10, Iding above-grade structure was completed in removed to 1 m (3.3 ft) below ground surface, in July 2010. The don January 9 and 10, 2012. Confirmatory sampling sample location 15, due to total petroleum hydrocarbons el. On January 2, 2013, remediation was performed at mediation surrounding the perimeter of the press pit concrete was performed on January 3, 2013. The selected remedy et specified soil cleanup levels, (2) disposing of contaminated osal Facility, (3) demonstrating through confirmatory and
The confirmatory and verification sample results were evaluated remedial action objectives (RAOs), and cleanup levels from Operable Unit, Hanford Site, Benton County, Washington (30 Region 10, Seattle, Washington (EPA 2001) and the Remediation Area, (300 Area RDR/RAWP) DOE/RL-2001-47, Rev. 3 Richland, Washington (DOE-RL 2009). In accordance with results support a reclassification of the 300-32 waste site to	the Interim Action Record of Decision for the 300-FF-2 00-FF-2 ROD), U.S. Environmental Protection Agency, dial Design Report/Remedial Action Work Plan for the 8, U.S. Department of Energy, Richland Operations Office, this evaluation, the confirmatory and verification sampling

RAGs, RAOs and cleanup levels established by the 300-FF-2 ROD (EPA 2001) and the 300 Area RDR/RAWP (DOE-RL 2009). The results of confirmatory and verification sampling do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow-zone soils (i.e., surface to 4.6 m [15 ft] deep). The analytical results and rationale presented in the attached remaining sites verification package also demonstrate that the 300-32 waste site is protective of groundwater and the Columbia River. Institutional controls to prevent uncontrolled drilling or excavation into the deep-zone soil are not required. The basis for reclassification is described in detail in the

Remaining Sites Verification Package for the 300-32 waste site (attached).

A-6006-136 (REV 0)

WASTE SITE RECLASSIFICATION FORM					
Operable Unit:	300-FF-2	Control	No.: 2013-006		
Naste Site Code	e(s)/Subsite Code(s): 300-32				
tegulator comn	nents:				
aste Site Cont	rols:				
ngineered Control	ls: 🗌 Yes 🛛 No Institution	onal Controls: Yes No C	0&M Requirements: Yes 🛛 No		
any of the Wast	te Site Controls are checked Y	es, specify control requirements inclu	iding reference to the Record of		
ecision, TSD Cl	osure Letter, or other relevant	documents:			
NA					
M. S. French		mittand	0/2./12		
	al Project Director (printed)	Signature	5/21/13 Date		
N1/A					
N/A Ecology F	Project Manager (printed)	Signature	Date		
L. E. Gadbois		Land Marallion	3-21-13		
	roject Manager (printed)	Signature	Date		

# REMAINING SITES VERIFICATION PACKAGE FOR THE 300-32 WASTE SITE

Attachment to Waste Site Reclassification Form 2013-006

March 2013

# REMAINING SITES VERIFICATION PACKAGE FOR THE 300-32 WASTE SITE

#### **EXECUTIVE SUMMARY**

The 300-32, 333 Building; 333 N Fuels Manufacturing Building; New Fuel Cladding Facility; 333 Building Remaining Soils waste site is located in the 300-FF-2 Operable Unit in the 300 Area of the Hanford Site. The 333 Building was north of Ginko Street, east of the 3720 Building, and west of the 303M, 334-A Building and 334 Tank Farm. The waste site consisted of the remaining contaminated components of the former 333 Building, including the concrete pad, subgrade soil, and piping. This waste site is not associated with 618-1, located to the east of the 300-32.

Demolition of the 333 Building above-grade structure was completed in September 2006. The 333 Building slab was removed to 1 m (3.3 ft) below ground surface (bgs), with the exception of the Loewy Press Pit. The Loewy Press was removed in February 2008 (WCH 2011). The Press Pit was demolished to 1 m (3.3 ft) bgs in July 2010 and disposed of at the Environmental Restoration Disposal Facility (ERDF). The remaining below grade structure of the Loewy press pit was left in place.

Confirmatory sampling at the 300-32 waste site was conducted January 9 and 10, 2012, per the approved Confirmatory Work Instruction of 300-32, 333 Building Remaining Soils (WCH 2008). Confirmatory sample results indicated that the focused sample collected at location 15 exceeded the direct exposure cleanup level for total petroleum hydrocarbons (TPH). Remediation was performed in January 2013, to remediate the area at sample location 15 and to remove additional soil surrounding the perimeter of the Loewy Press Pit. The additional removal extended 1 m (3.3 ft) beyond the perimeter of the press pit concrete foundation. The final depth of the 300-32 waste site excavation at the press pit location was 2 m (6.6 ft).

The excavation of the press pit area of the 300-32 waste site resulted in a total of approximately 398 bank cubic meters (521 bank cubic yards) of contaminated soil and debris being removed. All material was direct loaded for disposal at ERDF. The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the ERDF, (3) demonstrating through confirmatory and verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification as Interim Closed Out.

Following additional remediation, verification sampling was conducted on January 3, 2013, per the approved *Work Instruction for 300-32 Waste Site Additional Remediation and Verification Sampling* (WCH 2013a). The results indicated that the waste removal action achieved compliance with the remedial action objectives (RAOs) and remedial action goals (RAGs) for the 300-32 waste site. The site was backfilled in January 2013, after final verification data evaluation and regulatory approval (EPA 2013). A summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table ES-1.

Table ES-1. Summary of Remedial Action Goals for the 300-32 Waste Site.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?	
Direct Exposure – Radionuclides	Attain a dose rate of less than 15-mrem/yr above background over 1,000 years.	Maximum dose rate for the 300-32 waste site calculated using sum-of-fractions evaluations is 7.87 mrem/yr above background for focused samples.	Yes	
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COC and COPC concentrations are below the direct exposure criteria.	Yes	
	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COCs/COPCs are <1.		
Risk Requirements -	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for all sampling areas $(3.8 \times 10^{-1})$ is <1.	Yes	
Nonradionuclides	Attain an excess cancer risk of <1 x 10 <sup>-6</sup> for individual carcinogens.	Excess cancer risk values for individual nonradionuclide COCs/COPCs are <1 x 10 <sup>-6</sup> .		
a)	Attain a cumulative excess cancer risk of <1 x 10 <sup>-5</sup> for carcinogens.	The total excess carcinogenic risk for all sampling areas (7.9 x 10 <sup>-7</sup> ) is <1 x 10 <sup>-5</sup> .		
	Attain single COC groundwater and river RAGs.	groundwater/river protection lookup values.		
Groundwater/River Protection – Radionuclides	Attain National Primary Drinking Water Regulations: 4 mrem/yr (beta/gamma) dose standard to target receptor/organ <sup>a</sup> .	No radionuclide COPCs were quantified above groundwater/river protection lookup values.		
	Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25 <sup>th</sup> of the derived concentration guide for DOE Order 5400.5 b.	No alpha-emitting radionuclide COPCs were quantified above groundwater/river protection lookup values.	Yes	
	Meet total uranium standard of 21.2 pCi/L c.	Uranium was quantified below levels that are protective of 300 Area groundwater.		
Groundwater/River Protection – Nonradionuclides  Attain individual nonradionuclide groundwater and Columbia River cleanup requirements.		Residual concentrations of aroclor-1248, aroclor-1254, aroclor-1260, total PCBs, benzo(a)anthracene, benzo(a)pyrene, and benzo(k)fluoranthene exceeded soil RAGs for the protection of groundwater and/or the Columbia River. However, RESRAD modeling predicts that these constituents will not migrate to groundwater (and thus the Columbia River) at concentrations exceeding groundwater or river protection criteria within 1,000 years. Therefore, residual contaminant concentrations achieve the remedial action objectives for groundwater and river protection d.	Yes	

<sup>&</sup>lt;sup>a</sup> "National Primary Drinking Water Regulations" (40 Code of Federal Regulations 141).

Radiation Protection of the Public and Environment (DOE Order 5400.5).

COC = contaminant of concern

RAG = remedial action goal

COPC= contaminant of potential concern

RDR/RAWP = Remedial Design Report/ Remedial Action Work Plan for the 100 Area

= RESidual RADioactivity (dose assessment model) RESRAD

DOE = U.S. Department of Energy MCL = maximum contaminant level

Based on the isotopic distribution of uranium in the Hanford Site Background, the 30 µg/L MCL (40 Code of Federal Regulations 141.66) corresponds to 21.2 pCi/L. Concentration-to-activity calculations are documented in Calculation of Total Uranium Activity Corresponding to a Maximum Contaminant Level for Total Uranium of 30 Micrograms per Liter in Groundwater (BHI 2001).

Based on RESRAD modeling using input parameters and soil-partitioning coefficients from the Remedial Design Report/Remedial Action Work Plan for the 300 Area (DOE-RL 2009) for an unrestricted land use scenario, residual concentrations of aroclor-1248, aroclor-1254, aroclor-1260, benzo(a)anthracene, and benzo(k)fluoranthene are not expected to migrate more than 1 m (3.3 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient [aroclor-1248] of 43.9 mL/g). The vadose zone underlying the soil below the site is approximately 14 m (46 ft) thick based on an elevation at the 300-32 waste site of 119 m (391 ft) and a groundwater elevation of approximately 105 m (344 ft). Therefore, residual concentrations of aroclor-1248, aroclor-1254, aroclor-1260, benzo(a)anthracene, and benzo(k)fluoranthene are predicted to be protective of groundwater and the Columbia River.

The results of the confirmatory and verification sampling are used to make reclassification decisions for the 300-32 waste site in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2011a).

In accordance with this evaluation, the confirmatory and verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the RAOs and the corresponding RAGs established in the Remedial Design Report/Remedial Action Work Plan for the 300 Area (DOE-RL 2009) and the Interim Action Record of Decision for the 300-FF-2 Operable Unit, Hanford Site, Benton County, Washington (300-FF-2 ROD) (EPA 2001). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow-zone soil (i.e., surface to 4.6 m [15 ft]), and contaminant levels remaining in the soil are protective of groundwater and the Columbia River. Contamination at the 300-32 waste site did not extend into the deep zone (below 4.6 m [15 ft]); therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the site are not required.

Soil cleanup levels were established in the 300-FF-2 ROD (EPA 2001) based in part on a limited ecological risk assessment. Although not required by the 300-FF-2 ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Those constituents exceeding the ecological screening levels in the *Washington Administrative Code* Chapter 173-340, Table 749-3, were boron, uranium and vanadium. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for lead, manganese, and vanadium. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum focused sample levels of manganese and vanadium are below Hanford Site background levels, it is believed that the presence of these constituents do not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River Corridor portion of the Hanford Site.

# REMAINING SITES VERIFICATION PACKAGE FOR THE 300-32 WASTE SITE

#### STATEMENT OF PROTECTIVENESS

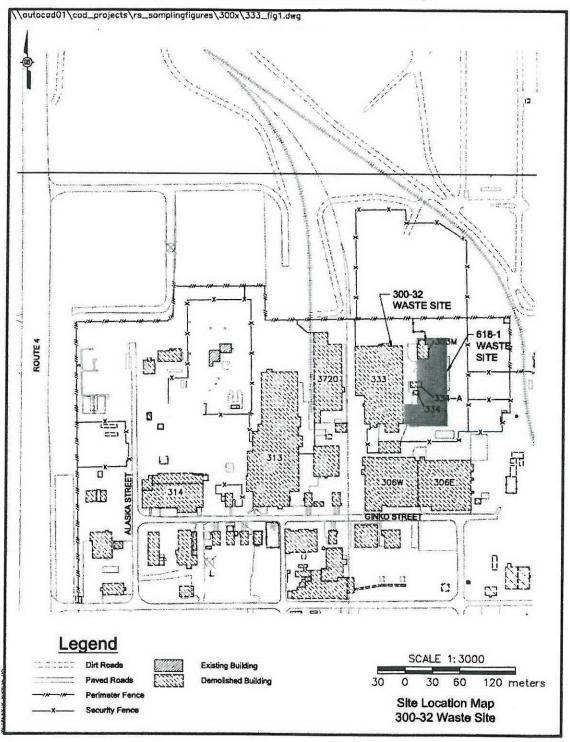
The 300-32, 333 Building; 333 N Fuels Manufacturing Building; New Fuel Cladding Facility, 333 Building Remaining Soils waste site confirmatory and verification sampling data, site evaluations, and supporting documentation demonstrate that this site meets the objectives established in the Remedial Design Report/Remedial Action Work Plan for the 300 Area (RDR/RAWP) (DOE-RL 2009) and the Interim Action Record of Decision for the 300-FF-2 Operable Unit, Hanford Site, Benton County, Washington (300-FF-2 ROD) (EPA 2001). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a residential land-use scenario and are protective of groundwater and the Columbia River. Contamination at the 300-32 waste site did not extend into the deep zone. The waste site meets the remedial action goals (RAGs) and remedial action objectives (RAOs) for unrestricted land use; therefore, an institutional control to maintain industrial land use at the former waste site is not required.

Soil cleanup levels were established in the 300-FF-2 ROD (EPA 2001) based in part on a limited ecological risk assessment. Although not required by the 300-FF-2 ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Those constituents exceeding the ecological screening levels in the *Washington Administrative Code* Chapter 173-340, Table 749-3, were boron, uranium and vanadium. U.S. Environmental Protection Agency (EPA) ecological soil screening levels were exceeded for lead, manganese, and vanadium. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum focused sample levels of manganese and vanadium are below Hanford Site background levels, it is believed that the presence of these constituents do not pose a risk to ecological receptors. All exceedances will be evaluated in the context of additional lines of evidence for ecological effects as a part of the final closeout decision for the Columbia River Corridor portion of the Hanford Site.

#### GENERAL SITE INFORMATION AND BACKGROUND

The 300-32 waste site is the footprint of the former 333 Building located in the 300-FF-2 Operable Unit in the 300 Area of the Hanford Site (Figure 1). The waste site consisted of the remaining contaminated components of the former 333 Building, including the concrete pad, subgrade soil, and piping. The 333 Building was north of Ginko Street, east of the 3720 Building, and west of the 303M, 334-A Building, 334 Tank Farm and 618-1 Burial Ground. The 300-32 waste site is not associated with the 618-1 waste site. The 333 Building footprint is approximately a rectangle, 91.44 by 42.67 m (300 by 140 ft), enclosing an area of about 4,535 m<sup>2</sup> (48,817 ft<sup>2</sup>).

Figure 1. The 300-32 Waste Site Location Map.



The 333 Building was completed during 1961 to manufacture fuel elements for the new production reactor (N Reactor) using the co-extrusion process. Components were inspected and cleaned with nitric, nitric-hydrofluoric, and chromic-nitric-sulfuric acid (combined in a commercial product called Zinctone). The components were extruded in an extrusion press and machined to create fuel sections. Nitric acid was used to remove copper-silicon residues. Nitric-sulfuric acid was used to chemically mill excess uranium on fuel element ends. The fuel element was etched with nitric-hydrofluoric acids and brazed with a specific beryllium-Zircaloy-2 alloy. Fuel element supports or projections were welded on and the element underwent audioradiography. The fuel element received a final etch with nitric-hydrofluoric acid. The fuel element then underwent autoclave testing and inspection and was stored as a finished fuel element.

During the 1960s, the facility was used for testing and inspection of special lithium aluminate fuel targets used in the production of tritium. During the late 1980s, the 333 Building received modifications to prepare for the fabrication of tritium driver fuel elements for N Reactor, but the shutdown of the reactor ended this program.

Until April 1973, waste acid from fuels fabrication in the 333 Building was neutralized in a 14,385-L (3,800-gal) underground tank that contained limestone and was located on the east side of the 333 Building. In 1973, the Waste Acid Treatment System (WATS) began operating to treat both mixed and dangerous waste from the 333 Building and from nonroutine waste additions. The 333 Building portion of the 300 Area WATS was clean closed in 1999.

Demolition of the 333 Building above-grade structure was completed in September 2006 (WCH 2011). The 333 Building slab was removed to 1 m (3.3 ft) below ground surface (bgs), with the exception of the Loewy Press Pit. The Loewy Press was removed in February 2008 (WCH 2011). The Press Pit was demolished to 1 m (3.3 ft) bgs in July 2010 and disposed of at the Environmental Restoration Disposal Facility (ERDF). The Loewy press pit foundation with the sump was left in place. The reinforced concrete foundation with the intact sump is located in the middle of the 333 Building concrete slab (EPA 2012). The 300 Area, 333 Building Facility Status Change Form deferred the removal of 333 Building foundation to the 618-1 remedial action (WCH 2008a). After completion of remediation in January 2013, the 300-32 waste site excavation was backfilled on January 18, 2013, per the e-mail concurrence, "EPA Concurrence to Backfill 300-32" (EPA 2013). Photographs of 300-32 waste site remediation are presented in Appendix A, in chronological order.

#### **Confirmatory Sampling Summary**

Confirmatory sampling at the 300-32 waste site was conducted January 9 and 10, 2012 (WCH 2012). Fifteen focused soil samples, plus quality control samples, were collected as described in the *Confirmatory Work Instruction of 300-32, 333 Building Remaining Soils* (WCH 2008b). Samples were collected at the locations shown in Figure 2, with the exception of sample location 15, which was moved approximately 1 m (3 ft) to the west due to the presence of the concrete slab at the specified sampling location (WCH 2012). Field quality control samples consisted of one equipment blank sample, one field duplicate sample, and two trip blanks. All samples were submitted for full protocol laboratory analysis.

\\autocad01\cad\_projects\rs\_samplingfigures\300x\333\_fig3.dwg (E) MAINTENANCE SHOP NONDESTRUCTIVE MAINTENANCE WELDING AND GRINDING SHOP EXTRUSION 13E 593980 SCALE 1:500 Legend 20 meters 5 10 Sample Locations 333 N Fuels Building Simplified Floor Plan and **Confirmatory Sampling Locations** Note: 1. Coordinate system, Washington State Plane, South Zone

Figure 2. The 300-32 Waste Site Confirmatory Sampling Locations.

## **Contaminants of Potential Concern**

The contaminants of potential concern (COPCs) for the 300-32 waste site were identified based on the history of the 333 Building fuel fabrication operations and associated waste sites. The Facility Status Change Form documenting the site's demolition status identified contaminants of concern during demolition as radionuclides, metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), asbestos (Class II nonfriable), beryllium, and cadmium (WCH 2011). Contaminants of potential concern listed by the confirmatory work instruction (WCH 2008b) were arsenic, barium, cadmium, chromium, lead, lithium, hexavalent chromium, mercury, uranium-233/234, uranium-235, total uranium, chloride, nitrate, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), VOCs, and SVOCs. The expanded list of inductively coupled plasma (ICP) metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lithium, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package. Gross alpha and gross beta analysis were added for data evaluation purposes.

The laboratory analytical methods for the COPCs as specified in the confirmatory sampling work instruction (WCH 2008b) are listed in Table 1.

Table 1. Laboratory Analytical Methods.

Analytical Method	Contaminants of Potential Concern
ICP metals – EPA Method 6010	Arsenic, beryllium, cadmium, chromium, lead, lithium a
Hexavalent chromium - EPA Method 7196	Hexavalent chromium
Mercury - EPA Method 7471	Mercury
Isotopic uranium	Uranium-233/234, uranium-235, total uranium
GEA – Gamma spectroscopy	Gamma-emitting radionuclides
Gross alpha – proportional counting	Alpha-emitting radionuclides
Gross beta – proportional counting	Beta-emitting radionuclides
IC Anions – EPA Method 300.0	Chloride, nitrate
PCB - EPA Method 8082	Polychlorinated biphenyls
SVOA – EPA Method 8270	Semivolatile organic compounds
VOA – EPA Method 8260	Volatile organic compounds
TPH – EPA Method 418.1	Total petroleum hydrocarbons

<sup>&</sup>lt;sup>a</sup> The expanded list of ICP metals included antimony, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, lithium, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.

EPA = U.S. Environmental Protection Agency

GEA = gamma energy analysis

IC = ion chromatography

ICP = inductively coupled plasma

PCB = polychlorinated biphenyl

SVOA = semivolatile organic analysis

TPH = total petroleum hydrocarbons

VOA = volatile organic analysis

### **Confirmatory Sampling Results**

The focused sampling results were evaluated using the maximum detected result for each COPC and comparing the value directly to the cleanup level. All confirmatory focused sample results are provided as an attachment to the Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk calculation in Appendix B.

Based on the evaluation of the confirmatory sampling results it was concluded that remediation was required at focused sample location 15 (EPA 2012). The TPH result of 1,300 mg/kg is much higher than the direct exposure cleanup level of 200 mg/kg, at sample location 15. Location 15 is near the center of the Loewy extrusion press pit, and, according to a description of the press room in the confirmatory work instruction, a "floor sump was used to contain used hydraulic oil" (WCH 2008b). Given the presence of the Loewy hydraulic extrusion press in this area, it is possible that the high TPH result is due to the accumulation of leaking hydraulic fluid.

#### REMEDIATION AT THE PRESS PIT

Remediation at the 300-32 waste site was performed on January 3, 2013, and included removal of 1 m (3.3 ft) of soil surrounding the entire perimeter of the remaining press pit concrete foundation (Figure 3). The removal extended 1 m (3.3 ft) from the perimeter of the Loewy press pit concrete foundation. The final depth of removal for soil surrounding the concrete foundation was 2 m (6.6 ft). All soil was direct loaded for disposal at ERDF. No stained concrete or soil was observed during additional remediation.

The remediation at the Loewy press pit area at the 300-32 waste site resulted in approximately 398 bank cubic meters (521 bank cubic yards) of contaminated soil and debris being removed. All material was direct loaded for disposal at ERDF. Photographs of 300-32 waste site remediation are presented in Appendix A, in chronological order.

#### RADIOLOGICAL SURVEYS

The initial Global Positioning Environmental Radiological Surveyor (GPERS) survey was performed on January 6, 2012, within the 300-32 waste site following 333 Building slab removal. Gamma surveying did not detect any elevated readings (above background levels). A survey map of the GPERS results is provided in Figure 4.

Figure 3. The 300-32 Waste Site and Loewy Press Pit Remediation Boundary. \\autocad01\cad\_projects\rs\_samplingfigures\300x\300—32\_fig3.dwg 333 BUILDING DEMOLITION BOUNDARY 3720 2013 PRESS PIT REMEDIATION BOUNDARY 300-32 WASTE SITE 3712 306-W Legend SCALE 1:1000

Perimeter Fence

Security Fence

Demollshed Building

20 10

300-32

WIDS Boundary Overlaid with

**Excavation Walkaround Boundary** 

40 meters

Survey Map Frepared By Bruce Coomer, ESI

Bkg Location 71 meters N 1277 cpm Figure 4. Site View The 300-32 Waste Site Gamma Track Map Copy **Summary Statistics** Legend 0 5 10 15 20 25 300 D4 NET CPM Coverage File: D4 00\$A Number of Data Pnts: 5927

X <1915 Type of Survey: gamma Max GCPM: 2312
Avg Bkg CPM: 1277
Survey Date: 1/6/2012
10000 - 25000 Area Surveyed: 593 m^2
25000 - 10000 September 2 of SPERMAZONO 333 Building Foot Print **GPERS Radiological Survey** EBERLINE SERVICES Gamma Track Map

00

Project = e: ESRFRM120005 Pdf File ESRFRM120005C

Radiological field screening for beta activity was conducted at the 300-32 waste site on January 5, 2013, using direct survey techniques, transferability surveys and technical smears. The survey was performed for down posting purposes, screening the excavation area, concrete monolith and pipe penetrations. No fixed or removable contamination was found. Beta survey activity of 12,000 dpm/100 cm<sup>2</sup> was identified at a single location. However, it was determined that this was due to a metal shard present inside the excavation. Following the removal of the metal shard, a verification radiological screening survey was performed. The survey results did not indicate any significant residual beta radiological activity. The verification radiological screening survey is included in the "EPA Concurrence to Backfill 300-32" (EPA 2013).

#### VERIFICATION SAMPLING ACTIVITIES

Following the completion of remediation, verification sampling was performed to evaluate residual contamination and determine if the site meets the cleanup criteria as specified in the 300 Area RDR/RAWP (DOE/RL 2009). A focused sampling approach was combined with composite sampling to evaluate the soils surrounding the Loewy press pit foundation following additional remediation (WCH 2012). All sampling was performed in accordance with ENV-1, Environmental Monitoring & Management procedures, consistent with the 300 Area Remedial Action Sampling and Analysis Plan (DOE/RL 2011b). The verification sample data was evaluated in combination with the confirmatory sample data.

The excavated area surrounding the press pit foundation was divided into two equal halves for sampling purposes. One composite sample was collected from each half of the excavated area (Figure 5). Each sample consisted of 25 aliquots collected across the surface of each half of the excavation.

In addition, one focused soil sample was collected from sample location 15, which had exceeded the TPH remedial action goals during confirmatory sampling. This focused sample was collected at Washington State Plane coordinates N 116217, E 593966. In sum, two composite samples, and one focused sample, were submitted for full protocol analysis for TPH only. A complete summary of the sample locations, including confirmatory and verification sampling, is presented in Table 2, and shown in Figure 6.

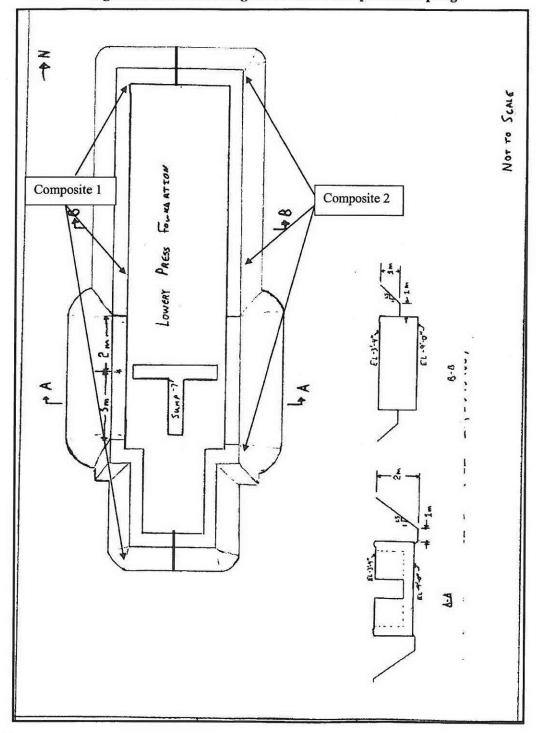


Figure 5. Remedial Design Sketch and Composite Sampling.

Table 2. 300-32 Sample Summary Table. (2 Pages)

Sample Identification	Sample Location	Sample Media			gton State rdinates (m)	Sample Date	Sample Analysi
Location 1	Tank 11		JINIMI	N 116231	E 593951		Anions, nitrite/nitrate, TPH, ICP metals a, hexavalent chromium, mercury, PCBs, gross alpha, gross beta, GEA, isotopic uranium, uranium (total), SVOA, PAH, and VOA
Location 2	Under WATS trench, west intersection		J1N1M2	N 116237	E 593952	1/9/2012	
Location 3	Under WATS trench, west intersection inside chem bay		JIN1M3	N 116237	E 593959		
Location 4	Under WATS trench, west-center intersection inside chem bay		JIN1M4	N 116237	E 593965		
Location 5	Under WATS trench, east-center intersection inside chem bay		JINIM5	N 116237	E 593971		
Location 6	Under WATS trench, east intersection inside chem bay	Surface soil (at 1 m	JINIM6	N 116237	E 593977		
Location 7	Under WATS trench, east of chem bay	bgs depth)	JINIM7	N 116237	E 593985		
Location 8	Under WATS trench, intersection near west wall		JINIM8	N 116237	E 593991		
Location 9	Sump near east wall		JINIM9	N 116233	E 593991		
Location 10	Sump near autoclave pit		JIN1N0	N 116267	E 593976		
Location 11	Sump near west wall		JININ4	N 116219	E 593950		
Location 12	Sump near chem bay		JIN1N5	N 116245	E 593974		
Location 13	Sump in beta heat treat area		JININ6	N 116198	E 593980	1/10/2012	
Location 14	South end of autoclave pit		JININ7	N 116250	E 593980		
Location 15 <sup>b</sup>	Near center of extrusion press pit		JIN1N8	N 116217	E 593966		
Resample of JIN1N8	Post remediation sample	Soil at 2 m bgs	JIR866	N 116217	E 593966	1/3/2013	ТРН

Table 2. 300-32 Sample Summary Table. (2 Pages)

Sample Identification	Sample Location	Sample Media	- I Sample He						Sample Analysis
Comp-1	Composite-1 west (Press pit post remediation)	Soil 1-2 m bgs	J1R867	NA	NA	1/3/2013	ТРН		
Comp-2	Composite-2 east (Press pit post remediation)	Soil 1-2 m bgs	J1R868	NA	NA	1/3/2013	ТРН		
Duplicate of J1N1N0	Location 10	Surface soil	JININI	N 116267	E 593976	1/9/2012	Same analytical lis as corresponding primary sample		
Equipment blank	NA	Silica sand	JIN1N3	NA	NA	1/10/2012	ICP metals <sup>a</sup> , SVOA, and mercury		
Trip blank	NA	Silica sand	JIN1M0	NA	NA	1/9/2012	VOA		
Trip blank	NA	Silica sand	JIN1N2	NA	NA	1/10/2012	VOA		

The expanded list of ICP metals was performed to include antimony, arsenic, barium, beryllium, boron, cadmium, chromium (total), cobalt, copper, lead, lithium, manganese, molybdenum, nickel, selenium, silver, vanadium, and zinc in the analytical results package.
 Sample location 15 near the center of the base of the Loewy extrusion press was moved approximately 1 m (3 ft) to the west due to the concrete slab. Due to elevated TPH in the confirmatory sample, this location underwent remediation with verification sampling for TPH only.

	_	L . 1		
bgs	-	pelow	ground	surface

PCB = polychlorinated biphenyl SVOA = semivolatile organic analysis

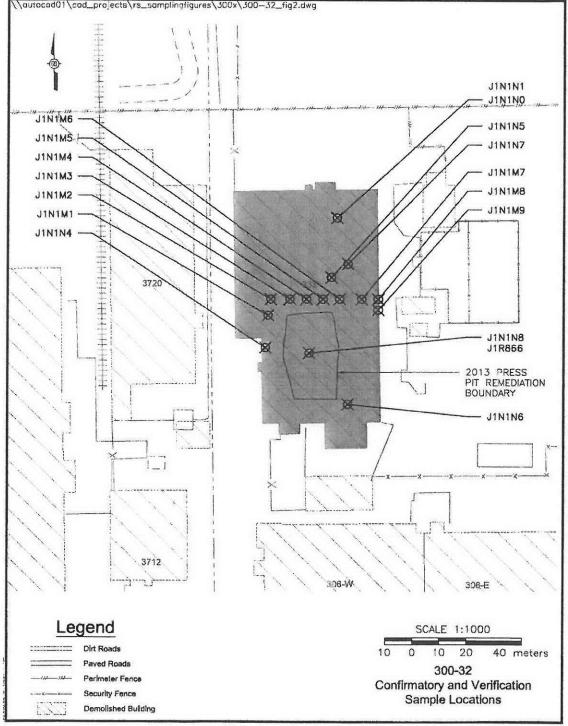
TPH = total petroleum hydrocarbons
VOA = volatile organic analysis

WATS = Waste Acid Treatment System

GEA = gamma energy analysis HEIS = Hanford Environmental Information System

ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons

Figure 6. The 300-32 Waste Site Confirmatory and Verification Sample Locations. \\autocad01\cad\_projects\rs\_samplingfigures\300x\300-32\_fig2.dwg



#### CONFIRMATORY AND VERIFICATION SAMPLE RESULTS

Confirmatory and verification samples were analyzed using EPA-approved analytical methods. Comparisons of the maximum results for COPCs against the residential site RAGs for focused samples of the 300-32 waste site are summarized in Table 3. Contaminants that were not detected by laboratory analysis are excluded from this table, but are reported in Appendix B. Calculated cleanup levels are not presented in the Cleanup Levels and Risk Calculations Database (Ecology 2013) under WAC 173-340-740(3) for calcium, magnesium, potassium, silicon, and sodium. The EPA's Risk Assessment Guidance for Superfund (EPA 1989) recommends that aluminum and iron not be considered in site risk evaluations. Therefore, aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not considered site COPCs and are not included in these tables.

The laboratory-reported confirmatory and verification data results for all constituents are stored in the Environmental Restoration (ENRE) project-specific database prior to archival in the Hanford Environmental Information System (HEIS) and are presented as an attachment of the RPD and Direct Hazard Quotient and Carcinogenic Risk calculation (Appendix B).

#### VERIFICATION SAMPLE DATA EVALUATION

This section demonstrates that contaminant concentrations at the 300-32 waste site achieve the applicable RAGs developed to support residential land use in the 300 Area as established in the 300-FF-2 ROD (EPA 2001) and documented in the RDR/RAWP (DOE-RL 2009). Table 3 compares the confirmatory and verification focused sample results to the applicable soil RAGs for unrestricted direct exposure, protection of groundwater, and protection of the Columbia River.

#### Attainment of Radionuclide Residential Direct Exposure RAGs

Table 4 compares the radionuclide confirmatory and verification results for the focused data set to direct exposure single radionuclide 15 mrem/yr dose-equivalence values and shows the sum of fractions evaluation for comparison of the total radionuclide dose to the RAG of 15 mrem/yr. The columns on the left side of the tables are the COPCs and the radionuclide activities corrected for background, as appropriate. The third column presents the single radionuclide 15 mrem/yr dose-equivalence activities, and the last column presents the radionuclide activities divided by the dose-equivalence activities. As demonstrated by the summation of these fractions, the cumulative dose contributed by residual radionuclide populations will be less than the 15 mrem/yr RAG at 7.87 mrem/yr.

Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 300-32 Waste Site Confirmatory and Verification Samples. (2 Pages)

CORC	Maximum	S	oil Lookup Values (pCi/g)	Does the Maximum	Do the Results Pass	
COPC	Result (pCi/g)	Unrestricted Direct Exposure	Unrestricted Protective of Groundwater	Unrestricted Protective of the River	Result Exceed RAGs?	RESRAD Modeling?
Uranium-233/234	7.32	27.2	17.9	17.9	No	-
Uranium-235	0.342	2.7	1.8	1.8	No	T
Uranium-238	6.59	26.2	17.3	17.3	No	<b> </b>
Chambin 250	0.57		Cleanup Levels * (n	7.7	Does the	
COPC	Maximum Result (mg/kg)	Unrestricted Direct Exposure	Protective of Groundwater	Protective of the River	Maximum Result Exceed RAGs?	Do the Results Pass RESRAD Modeling?
Arsenic	3.84 ( <bg)< td=""><td>20<sup>b</sup></td><td>20 <sup>b</sup></td><td>20 <sup>6</sup></td><td>No</td><td>-</td></bg)<>	20 <sup>b</sup>	20 <sup>b</sup>	20 <sup>6</sup>	No	-
Barium	95.7 ( <bg)< td=""><td>1,600°</td><td>200</td><td>400</td><td>No</td><td>-</td></bg)<>	1,600°	200	400	No	-
Beryllium	0.270 ( <bg)< td=""><td>10.4°</td><td>1.51 <sup>d</sup></td><td>1.51 <sup>d</sup></td><td>No</td><td>-</td></bg)<>	10.4°	1.51 <sup>d</sup>	1.51 <sup>d</sup>	No	-
Boron <sup>c</sup>	4.87	16,000	320	NA	No	
Cadmium	0.189 ( <bg)< td=""><td>13.9°</td><td>0.81 d</td><td>0.81 d</td><td>No</td><td>( <u></u></td></bg)<>	13.9°	0.81 d	0.81 d	No	( <u></u>
Chromium (total)	9.41 ( <bg)< td=""><td>120,000</td><td>18.5 d</td><td>18.5 d</td><td>No</td><td></td></bg)<>	120,000	18.5 d	18.5 d	No	
Cobalt	5.54 ( <bg)< td=""><td>24</td><td>15.7 d</td><td>NA</td><td>No</td><td>_</td></bg)<>	24	15.7 d	NA	No	_
Copper	21.3 ( <bg)< td=""><td>2,960</td><td>59.2</td><td>22.0 d</td><td>No</td><td>-</td></bg)<>	2,960	59.2	22.0 d	No	-
Lead	13.4	353	NA <sup>f</sup>	NA <sup>f</sup>	No	-
Lithium	6.64 ( <bg)< td=""><td>160</td><td>33.5 <sup>d</sup></td><td>NA</td><td>No</td><td></td></bg)<>	160	33.5 <sup>d</sup>	NA	No	
Manganese	308 ( <bg)< td=""><td>3,700</td><td>512 <sup>d</sup></td><td>512 d</td><td>No</td><td></td></bg)<>	3,700	512 <sup>d</sup>	512 d	No	
Molybdenum <sup>e</sup>	0.736	400	8	NA	No	
Nickel	8.71 ( <bg)< td=""><td>1,600</td><td>19.1 <sup>d</sup></td><td>27.4</td><td>No</td><td></td></bg)<>	1,600	19.1 <sup>d</sup>	27.4	No	
Uranium	21.4	81	53	106	No	_
Vanadium	45.2 ( <bg)< td=""><td>560</td><td>85.1 <sup>d</sup></td><td>NA</td><td>No</td><td>-</td></bg)<>	560	85.1 <sup>d</sup>	NA	No	-
Zinc	45.7 ( <bg)< td=""><td>24,000</td><td>480</td><td>67.8 <sup>d</sup></td><td>No</td><td></td></bg)<>	24,000	480	67.8 <sup>d</sup>	No	
Chloride	312	NA NA	25,000	NA	No	-
Fluoride	1.1 ( <bg)< td=""><td>4,800</td><td>96</td><td>400</td><td>No</td><td></td></bg)<>	4,800	96	400	No	
Nitrate (as nitrogen)	16.3	8,000	1,000	2,000	No	
Sulfate	246	NA	25,000	NA	No	
TPH – diesel range	1.18	200	200	200	No	1531
TPH – motor oil	106	200	200	200	No	
Acetone	0.0422	72,000	720	NA	No	
Acenaphthene	0.0977	4,800	96	129	No	
Acenaphthylene g	0.00719	4,800	96	129	No	_
Aroclor-1248	0.0365	0.5	0.017 <sup>f</sup>	0.017 f	Yes	Yes h
Aroclor-1254	0.318	0.5	0.017 <sup>f</sup>	0.017 f	Yes	Yes h
Aroclor-1260	0.0962	0.5	0.017 <sup>f</sup>	0.017 f	Yes	Yes h
Total PCBs	0.451	0.5	0.017 <sup>f</sup>	0.017 f	Yes	Yes h
Benzo(a)anthracene	0.0456	1.37	0.015 f	0.015 f	Yes	Yes h
Benzo(a)pyrene	0.0122	0.137	0.015 f	0.015 f	No	
Benzo(b)fluoranthene	0.0130	1,37	0.015 f	0.015 f	No	
Benzo(ghi)perylene g	0.00540	2,400	48	192	No	
Benzo(k)fluoranthene	0.0186	1.37	0.015 f	0,015 <sup>f</sup>	Yes	Yes h
Chrysene	0.0850	13.7	0.12	0.015 0.1 f	No	
Di-n-butylphthalate	0.0830	8,000	160	540	No No	

Table 3. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 300-32 Waste Site Confirmatory and Verification Samples. (2 Pages)

СОРС		Soil C	leanup Levels <sup>a</sup> (n	Does the	Do the	
	Maximum Result (mg/kg)	Unrestricted Direct Exposure	Protective of Groundwater	Protective of the River	Maximum Result Exceed RAGs?	Results Pass RESRAD Modeling?
Fluoranthene	0.218	3,200	64	18.0	No	
Fluorene	0.0415	3,200	64	260	No	
Indeno(1,2,3-cd)pyrene	0.00908	1.37	0.33 <sup>f</sup>	0.33 <sup>f</sup>	No	-
Naphthalene	0.108	1,600	16.0	988	No	
Phenanthrene g	0.00719	24,000	240	1,920	No	-
Pyrene	0.00903	2,400	48	192	No	

Lookup values and RAGs obtained from the RDR/RAWP (DOE-RL 2009) as amended by Tri-Party Agreement Change Notice TPA-CN-407 (DOE-RL 2010) unless otherwise noted.

b The arsenic cleanup level of 20 mg/kg has been agreed to by the Tri-Party Agreement Project Managers.

Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 1996).

No Hanford Site-specific or Washington State background value available.

E Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals:

Contaminant: acenaphthylene; surrogate: acenaphthene Contaminant: benzo(g,h,i)perylene; surrogate: pyrene

Contaminant: phenathrene; surrogate: anthracene.

Based on RESRAD modeling using input parameters and soil-partitioning coefficients from the RDR/RAWP (DOE-RL 2009) for an unrestricted land use scenario, residual concentrations of aroclor-1248, aroclor-1254, aroclor-1260, benzo(a)anthracene, and benzo(k)fluoranthene are not expected to migrate more than 1 m (3.3 ft) vertically in 1,000 years (based on the contaminant with the lowest distribution coefficient [aroclor-1248] of 43.9 mL/g). The vadose zone underlying the soil below the site is approximately 14 m (46 ft) thick based on an elevation at the 300-32 waste site of 119 m (391 ft) and a groundwater elevation of approximately 105 m (344 ft). Therefore, residual concentrations of aroclor-1248, aroclor-1254, aroclor-1260, benzo(a)anthracene, and benzo(k)fluoranthene are predicted to be protective of groundwater and the Columbia River.

= not applicable RDL = required detection limit = background RDR/RAWP = Remedial Design Report/Remedial Action Work Plan for COPC = contaminant of potential concern the 300 Area RESRAD = not applicable = RESidual RADioactivity (dose model) PCB = polychlorinated biphenyls TPH = total petroleum hydrocarbons RAG = remedial action goal WAC = Washington Administrative Code

Table 4. Attainment of Radionuclide Unrestricted Direct Exposure Remedial Action Goals (Focused Samples).

Contaminants of Potential Concern	Focused Sample Analytical Values above Background (pCi/g)	Activity Equivalent to 15 mrem/yr Unrestricted Dose * (pCi/g)	Fraction
Uranium-234	6.22	27.2	0.229
Uranium-235	0.232	2.7	0.0859
Uranium-238	5.49	26.2	0.210
70		Total	0.525
0.000		Equivalent Dose (mrem/yr)	7.87

Single radionuclide 15 mrem/yr dose-equivalence values and derivation methodology are presented in DOE/RL-2001-47, Remedial Design Report/Remedial Action Work Plan for the 300 Area (DOE-RL 2009).

<sup>&</sup>lt;sup>6</sup> Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) (Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m³ (WDOH 1997).

Where cleanup levels are less than RDLs, cleanup levels default to RDLs per Ecology (1996), WAC 173-340-707(2).

## Nonradionuclide Direct Contact Hazard Quotient and Carcinogenic Risk RAGs Attained

Nonradionuclide risk requirements include individual hazard quotients of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than  $1 \times 10^{-6}$ , and a cumulative carcinogenic risk of less than  $1 \times 10^{-5}$ . For the 300-32 waste site, these risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background levels. All individual hazard quotients for noncarcinogenic constituents were less than 1.0. The cumulative hazard quotient for those noncarcinogenic constituents above background or detected levels is  $3.8 \times 10^{-1}$ . The carcinogenic risk value for the carcinogenic constituents above background or detected levels is  $7.9 \times 10^{-7}$ , which is less than the criteria of  $1 \times 10^{-5}$ .

#### Nonradionuclide Soil RAGs for Groundwater and River Protection Attained

Evaluation of the results listed in Table 3 from the confirmatory and verification sampling at the 300-32 waste site indicated that all nonradionuclide COPCs were undetected and/or quantified below RAGs and lookup values, except for aroclor-1248, aroclor-1254, aroclor-1260, total PCBs, benzo(a)anthracene, benzo(a)pyrene and benzo(k)fluoranthene. Residual concentrations of these constituents exceeded soil RAGs for the protection of groundwater and/or the Columbia River. Data were not collected on the vertical extent of these contaminants, but based on RESidual RADioactivity (RESRAD) input parameters and soil-partitioning coefficients for unrestricted land use from Appendix B, Table B-8b, of the 300 Area RDR/RAWP (DOE-RL 2009), constituents with soil-partitioning coefficients greater than 26 mL/g are predicted to show less than 1 m (3.3 ft) migration through vadose zone soil. The lowest soil-partitioning coefficient of the contaminants exceeding the RAGs, aroclor-1248, is 43.9 mL/g, and the vadose zone beneath the deepest excavation point of the 300-32 waste site is approximately 14 m (46 ft) thick. Therefore, residual concentrations of these contaminants are predicted to be protective of groundwater and the Columbia River.

#### DATA QUALITY ASSESSMENT

A data quality assessment (DQA) was performed to compare the confirmatory and verification sampling approach (WCH 2013a), the field logbooks (WCH 2012, WCH 2013b), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

The DQA for the 300-32 waste site established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup confirmatory and verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to archival in the HEIS and are provided as an attachment to the Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk calculation in Appendix B. The detailed DQA is presented in Appendix C.

#### SUMMARY FOR INTERIM CLOSURE

The 300-32 waste site has been evaluated in accordance with the 300-FF-2 ROD (EPA 2001) and the RDR/RAWP (DOE-RL 2009). Confirmatory and verification sampling was performed, and the analytical results indicate that the residual concentrations of COPCs at this site meet the RAGs and corresponding RAOs for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the confirmatory and verification sampling results support a reclassification of the 300-32 waste site to Interim Closed Out. These results show that residual soil concentrations support future land uses that can be represented (or bounded) by an unrestricted land-use scenario and are protective of groundwater and the Columbia River. The 300-32 waste site meets the RAGs and RAOs for unrestricted land use; therefore, no institutional controls to maintain industrial land use of the site are required.

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## APPENDIX A

# 333 BUILDING, 333 BUILDING SLAB AND 300-32 WASTE SITE POST-REMEDIATION PHOTOGRAPHS

333 Building

334-A Building

334-A Building

WATS trench exiting building on west side

Figure A-1. Areal Photograph of the 333 Building in 1982 (Looking Northeast).

Figure A-2. A Portion of the 300-32 Waste Site Slab in 2008.

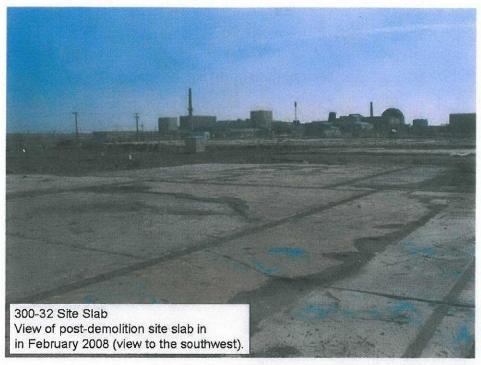


Figure A-3. The 300-32 Waste Site Loewy Press Pit in 2008.

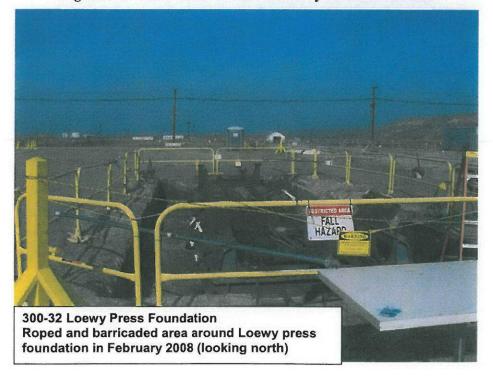


Figure A-4. Areal Photograph of the 300-32 Waste Site in 2011 (Looking Southeast).

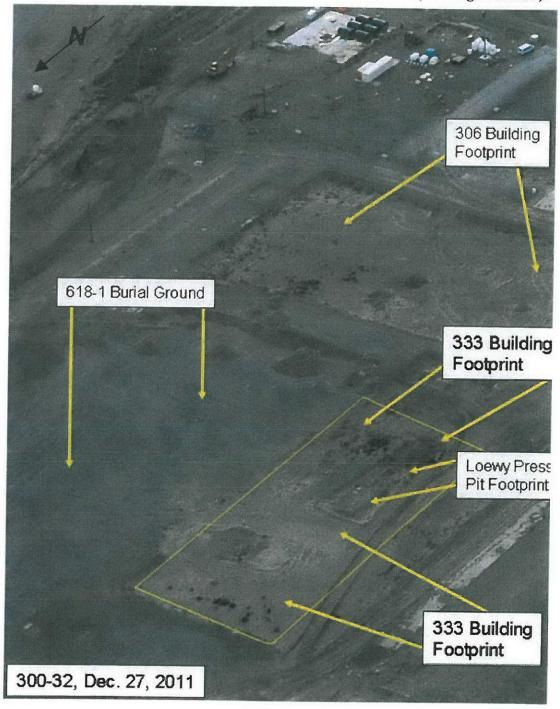
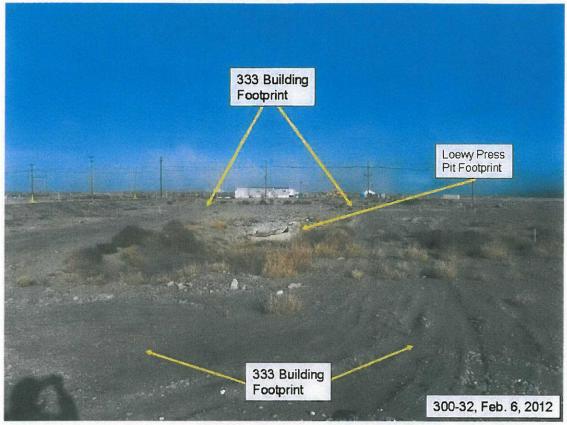


Figure A-5. The 300-32 Waste Site on February 6, 2012, Site Visit (Looking North).



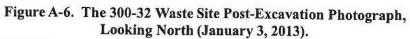




Figure A-7. The 300-32 Waste Site Post-Excavation Photograph, Looking Northwest (January 3, 2013).



Figure A-8. Aerial Photograph of the 300-32 Waste Site Location Backfilled and Revegetated. Looking North (February 1, 2013).



# APPENDIX B

RELATIVE PERCENT DIFFERENCE (RPD), DIRECT CONTACT HAZARD QUOTIENT, AND CARCINOGENIC RISK CALCULATIONS

# APPENDIX B

# **CALCULATION BRIEF**

The calculations in this appendix are kept in the active Washington Closure Hanford project files and are available upon request. When the project is completed, the file will be stored in a U.S. Department of Energy, Richland Operations Office repository. This calculation has been prepared in accordance with ENG-1, *Engineering Services*, ENG-1-4.5, "Project Calculation," Washington Closure Hanford, Richland, Washington. The following calculations are provided in this appendix:

300-32 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculation, 0300X-CA-V0167, Rev. 0, Washington Closure Hanford, Richland, Washington.

# **DISCLAIMER FOR CALCULATIONS**

The calculations that are provided in this appendix have been generated to document compliance with established cleanup levels. These calculations should be used in conjunction with other relevant documents in the administrative record.

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# **CALCULATION COVER SHEET**

rea:	300 Area Remai	ning Sites				
Discip	line: Environ	nental	Calcu	ation No: 03	00X-CA-V0167	
ubjec	300-32 Waste and Carcinog	Site Relative I enic Risk Calcu	Percent Difference	e (RPD) and D	irect Contact Haz	ard Quotient
omp	uter Program: Ex	ccel	Program	No: Excel 2	003	
	The attached calcula	ations have been genera ould be used in conjunc	ated to document compliantion with other relevant d	nce with established clocuments in the admin	eanup levels. These calcuistrative record.	ulations
ommit	tted Calculation 🛛		Preliminary	Superseded		oided 🗌
Rev	Sheet Numbers	Originator	Checken	Reviewer	Approval	Date
0	Cover = 1 Summary = 7 Attachment 1 = 16 Total = 24	N. K. Schiffern N. K. Schillen	I. B. Berezovskiy	J. D. Skoglie	T. Q. Howell	,3/25/13
		SUN	MARY OF F	REVISION		4.5.000
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WCH-DE-018 (05/08/2007)

DE01-437.03

Washingto	n Closure Hanford,	Inc.	CALCULA	TION SHEE	T			
Originator:	N. K. Schiffern	718	Date:	1/14/2013	Calc. No.:	0300X-CA-V0167_A	Rev.:	0
Project:	300 Area Field Rem	nediation	Job No: 14655 Checked; 1			I. B. Berezovskiy,	Date:	1/14/2013
Subject:	300-32 Waste Site F Carcinogenic Risk (			RPD) and Dir			Sheet No	

# PURPOSE:

2

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 300-32 waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2009), the following criteria must be met:

9

11

12

- 1) An HQ of <1.0 for all individual noncarcinogens
- 2) A cumulative HQ of <1.0 for noncarcinogens
- 10 3) An excess cancer risk of <1 x 10<sup>-6</sup> for individual carcinogens
  - A cumulative excess cancer risk of <1 x 10<sup>-5</sup> for carcinogens.

13 14 15 Also, calculate the relative percent difference (RPD) for primary-duplicate and sample pairs from the 300-32 waste site verification and confirmatory sampling, as necessary.

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# GIVEN/REFERENCES:

18 19 20

 DOE-RL, 2009, Remedial Design Report/Remedial Action Work Plan for the 300 Area, DOE/RL-2001-47, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

 DOE-RL, 2011, 300 Area Remedial Action Sampling and Analysis Plan, DOE/RL-2001-48, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

26 27

 EPA, 1994, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013, U.S. Environmental Protection Agency, Washington, D.C.

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4) WAC 173-340, "Model Toxics Control Act - Cleanup," Washington Administrative Code, 1996.

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5) WCH, 2013, Remaining Sites Verification Package for the 300-32, 333 Building 333N Fuels Manufacturing Building; New Fuel Cladding Facility, 333 Building Remaining Soils Waste Site, Attachment to Waste Site Reclassification Form 2013-06, Washington Closure Hanford, Inc., Richland, Washington.

# SOLUTION:

 Generate an HQ for each noncarcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the individual HQ of <1.0 (DOE-RL 2009).

42 43 44

2) Sum the HQs and compare this value to the cumulative HQ of <1.0.

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Washingto	n Closure Hanford, Inc.	CALCULA	TION SHEE	т			
	N. K. Schiffern (V)	Date:			0300X-CA-V016700	Rev.:	0
	300 Area Field Remediation	Job No:	14655	Checked.	I B Berezovskin I	Date:	3/25/2013
Subject:	300-32 Waste Site Relative Perc Carcinogenic Risk Calculations	ent Difference (	RPD) and Dir	ect Contact Ha	azard Quotient and	Sheet No	

- Generate an excess cancer risk value for each carcinogenic constituent detected above background or required detection limit/practical quantitation limit and compare it to the excess cancer risk of <1 x 10<sup>-6</sup> (DOE-RL 2009).
  - 4) Sum the excess cancer risk value(s) and compare it to the cumulative cancer risk of <1 x 10<sup>-5</sup>.
  - Use data from WCH (2013) to perform the RPD calculations for primary-duplicate sample pairs, as required.

### METHODOLOGY:

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The 300-32 waste site underwent verification and confirmatory sampling at one decision unit. Fifteen focused samples were collected from this waste site. Also taken were one duplicate sample, two composite samples, one equipment blank, and two trip blanks. The direct contact hazard quotient and carcinogenic risk calculations for the 300-32 waste site were conservatively calculated for the entire waste site using the greatest of the maximum soil sample results (WCH 2013). Of the contaminants of potential concern (COPCs) for this waste site, uranium and nitrogen in nitrate require HQ and risk calculations because these analytes were detected above background values. Boron, molybdenum, detected polycyclic aromatic hydrocarbons (PAHs), detected polychlorinated biphenyls (PCB), di-nbutylphthalate, and acetone require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Lead was detected above background; however, lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. Although total petroleum hydrocarbons (diesel range plus motor oil) were detected and no background value is available, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. All other site nonradionuclide COPCs were not detected or were quantified below background levels. The entire data set was evaluated against the residential HQ and risk standards. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron is 4.87 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (calculated in accordance with the noncarcinogenic toxics effects formula in WAC 173-340-740[3]), produces an HQ value of 3.0 x 10<sup>-4</sup>. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.</p>

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation. The sum of the HQ values is 3.8 x 10<sup>-1</sup>. Comparing this value to the requirement of <1.0, this criterion is met.</p>

3) To calculate the excess cancer risk, the maximum value is divided by the carcinogenic RAG value, then multiplied by 1.0 x 10<sup>-6</sup>. For example, the maximum value for aroclor-1248 is 0.0365 mg/kg; divided by 0.5 mg/kg, and multiplied as indicated, is 7.3 x 10<sup>-8</sup>. Comparing this value to the requirement of <1 x 10<sup>-6</sup>, this criterion is met.

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	n Closure Hanford,	MA.	CALCULA	TION SHEE	.1			
Originator:	N. K. Schiffern	N/Z	Date:	1/14/2013	Calc No	0300X-CA-V0167 _	. Rev.:	-
Project:	300 Area Field Rem	nediation	Job No:	14655		I. B. Berezovskiy		1/1/2012
Subject:	300-32 Waste Site I Carcinogenic Risk (	Relative Perce	ent Difference (I	RPD) and Dir	ect Contact Ha	azard Quotient and	Date:	3 057

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The excess cancer risk for the carcinogenic constituents detected is 7.9 x 10<sup>-7</sup>. Comparing this value to the requirement of <1 x 10<sup>-5</sup>, this criterion is met.

5) The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed for certain analytes in Table II-1 of the SAP (DOE-RL 2011). Other analytes will have their own pre-determined constituents and will have their own TDLs based on the laboratory and method used. Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

# RPD = [|M-D|/((M+D)/2)]\*100

where, M = main sample value

D = duplicate sample value

When an analyte is detected in the primary or duplicate sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate results exceeds a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. This assessment is provided in the data quality assessment section of the RSVP.

For quality assurance/quality control (QA/QC) duplicate RPD calculations, a value less than 30% indicates the data compare favorably. For regulatory splits, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. No split samples were collected for the confirmatory sampling of the subject site. Additional discussion is provided in the data quality assessment section of the applicable RSVP (WCH 2013), as necessary.

# RESULTS:

- 1) List individual noncarcinogens and corresponding HQs >1.0: None
- 2) List the cumulative noncarcinogenic HQ >1.0: None
- 3) List individual carcinogens and corresponding excess cancer risk >1 x 10<sup>-6</sup>: None
- 40 4) List the cumulative excess cancer risk for carcinogens >1 x 10<sup>-5</sup>: None

Table 1 shows the results of the residential direct contact calculations.

The evaluation of the QA/QC duplicate and split RPD calculations are performed within the data
 quality assessment section of the RSVP.

Project:   300 Area Field Remediation   Tob No.   14655	Originator: N. K. Schiffern VVJ Date: 3/25/2013	Washington Closure Hanford, Inc. CALCULATION SHEE
14655	-	ATION SHEET
Checked.	Calc. No.:	7
I B Berezouskin	0300X-CA-V016	

Date: 3/2	The same of the same of	zard Quotient and	ect Contact Ha	nt Difference (RPD) and Direct Contr	nt Difference (.	Carcinogenic Risk Calculations	Subject:
3/2	/ Date:	I. B. Berezovskiy	Checked:	14655	Job No:	300 33 W Cit Remediation	I TOTAL
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١	Dan.	CALON-A J-XOUED	Calc No	3/25/2013	Date:	N. K. Schiffern VV	Originator:
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Table 2 shows the results of the RPD calculations for the 300-32 waste site.

Table 1. Residential Direct Contact HQ and Excess Cancer Risk Results for the 300-32 Waste Site. (2 pages)

			. 0		
Contaminants of Potential Concern	Maximum Value <sup>a</sup> (mg/kg)	Residential Noncarcinogen RAG <sup>b</sup> (mg/ke)	Hazard Quotient	Residential Carcinogen RAG <sup>b</sup>	Carcinogen Risk
Metals	3		SE MAN CONTRACTOR	(Surfam)	200
Boron	4.87	16.000	3.0E-04	1	
Lead <sup>c</sup>	13.4	353	1	1	
Molybdenum	0.736	400	1.8E-03	1	
Uranium	21.4	81	2.6E-01	1	
Semirolatiles					1
Di-n-butylphthalate	0.249	8,000	3.1E-05	1	Participant of the Control of the Co
Anions				**	
Nitrate as Nitrogen <sup>d</sup>	16.3	8,000	2.0E-03	1	1
Nitrite as Nitrogend	0.46	8,000	5.8E-05	ı	
Total Petroleum Hydrocarbons	· (		4	,	
TPH - Diesel and Motor Oil*	106	200	1		
Polycyclic Aromatic Hydrocarbons	1. 1. 1. 1.			1	
Acenaphthene	0.0977	4,800	2.0E-05	ı	
Acenaphthylene'	0.0719	4,800	1.5E-05		
Benzo(a)anthracene	0.0456	1	1	1.37	SU-SE E
Benzo(a)pyrene	0.0122	1	,	0 137	80 E 08
Benzo(b)fluoranthene	0.0130	1	1	1 37	9 SE_00
Benzo(k)fluoranthene	0.0186		-	1.37	1 4P-08
Benzo(ghi)perylene <sup>1</sup>	0.00540	2,400	2.3E-06	,	
Chrysene	0.0850		ı	13.7	6 2F-09
Fluoranthene	0.218	3,200	6.8E-05	1	
Fluorene	0.0415	3,200	1.3E-05	ı	•
Indeno(1,2,3-cd)pyrene	0.00908	1	ı	1.37	6.6E-09
Naphthalene	0.108	1,600	6.8E-05	ı	1
Phenanthrene'	0.00719	24,000	3.0E-07	1	
Pyrene	0.00903	2,400	3.8E-06	Ī	1
Aroclor-1248	0.0366				
Aroclor-1254	0 181	1,2	1001	0.0	1.3E-08
Aroclor-1260	0.0962	1 3	1 01	0.5	1 OE 07
	0.0702			0.5	1.9E-07

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	n Closure Hanford, Inc.	CALCULA	TION SHEE	T			
Originator:	N. K. Schiffern (V)	Date:	3/25/2013	Calc. No.:	0300X-CA-V0167	Rev.:	0
	300 Area Field Remediation	Job No:		Checked:	I. B. Berezovskiy r. V		3/25/2013
Subject:	300-32 Waste Site Relative Pero Carcinogenic Risk Calculations	ent Difference (	RPD) and Dir	ect Contact H	azard Quotient and	Sheet No	

Table 1.	Residential Direct Contact HQ and Excess Cancer Risk Results
	for the 300-32 Waste Site. (2 pages)

Contaminants of Potential Concern	Maximum Value <sup>a</sup> (mg/kg)	Residential Noncarcinogen RAG <sup>b</sup> (mg/kg)	Hazard Quotient	Residential Carcinogen RAG <sup>b</sup> (mg/kg)	Carcinoger Risk
Volatiles		APS A SECOND	VIII WARREN	(30,6)	CONTRACTOR OF
Acetone	0.0422	72,000	5.9E-07	L. * 15. Co. 15.	T
Totals		2.2.2	THE RESERVE	at the late to the second of	Maria de la como Proceso
Cumulative Hazard Quotient:			3.8E-01		4/
Cumulative Excess Cancer Risk:			J.OL-VI		7.05.05
Notes:					7.9E-07

11 Cumu 12 Notes:

" = From WCH (2013).

b = Value obtained from the RDR/RAWP (DOE-RL 2009) or Washington Administrative Code (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

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 e Value for the noncarcinogenic RAG calculated using Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA/540/R 93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

18 d = values converted from nitrate and nitrite.

e The risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation.

f = Toxicity data for these chemicals are not available. The cleanup levels are based on use of surrogate chemicals. accnaphthylene surrogate: acenaphthene

acenaphthylene surrogate: acenaphthen
 benzo(g,h,i)perylene surrogate: pyrene

22 benzo(g,h,i)perylene surrogate: pyrene phenanthrene surrogate: anthracene

24 = not applicable

RAG = remedial action goal

Table 2. Relative Percent Difference Calculations for the 300-32 Waste Site. (3 pages)

Sampling	HEIS	Sample	Bia	muth-	214	L	ead-21	2	Pat	lassium	-40	Pa	dlum-2	26
Area	Number	Date	pCl/g	Q	MDA	pCl/g	To	MDA	pCl/g	0	MDA	pCl/a		_
Location 10	J1N1N0	1/9/2012	0.466		0.075	0.979	1	0.057	19,8	-	0.366		Q	PQL
Duplicate of J1N1N0	J1N1N1	1/9/2012	0,410	1	0.052	0.700	1	0.037	16.2	-		0.453		0.073
Analysis:		0.00			0.002	0.100	_	0.037	10.2		0.212	0.398		0.051
70	)L			0.25			0.25	186		0.5			0.1	
	Both >	PQL?	Yes	(conti	nue)	Yes	(conth	nua)	Van		una)	V		
Desirate Assista	Both >	5xTDL?	No-Sto			No-Stop (acceptable)		Yes (continue) Yes (calc RPD)			Yes (continue) No-Stop (acceptable)			
Duplicate Analysis	RI	PD			,	110-010	lacce	punney	20.0%					
	Difference	> 2 TDL?			shie	No - acceptable		Not applicable		No - acceptable				
00-32 Waste Site Dupl	icate Analys	la					азар	alve	1401	appaca	DIG	No-	accepta	ble
Sampling	HEIB	Sample	Ra	dlum-	24	The	rlum-	228	The	orlum-2	32	Head	um-233	D24
Агеа	Number	Date	pCl/g	a	MDA	pCVg	a	MDA	pCVg	Q	MDA	pCl/p	0	
Location 10	J1N1N0	1/9/2012	0.853		0.167	0.946	-	0.055	0.853	4	0.167		u	PQL
Duplicate of J1N1N0	J1N1N1	1/9/2012	0.700		0.114	0.676		0.036	0.700			5.60		0.164
Analysis:				-	2.117	0.010		0.030	0.700		0.114	3.10		0.173
TD	L			0.2			1			-1				
	Both >	POL?	Ves	Conti	land	Van	Contin			(nanèle			1	

Remaining Sites Verification Package for the 300-32 Waste Site

nator. N. K. Schiffem	lington Closure Hanford, Inc.
Date:   I	CALCULA
1080013	CALCULATION SHEET

6 of 7	Sheet No. 6 of 7	azard Quotient and	et Contact Ha	(PD) and Dire	it Difference (I	300-32 Waste Site Relative Percent Difference (RPD) and Direct Contact Hazard Quotient and Carcinogenic Risk Calculations	Subject:
1/28/2013	Date:	I. B. Berezovskiy	Checked:	14655	Job No:	300 Area Field Remediation	Project:
	Rev.:	0300X-CA-V0167	Calc. No.:	1/28/2013	Date:	N. K. Schiffern	Originator.
			7	TION SHEE	CALCULA	Closure Hanford, Inc.	Washington

# Table 2. Relative Percent Difference Calculations for the 300-32 Waste Site. (3 pages)

	Duplicate Analysis		Arralysia: TDL	Duplicate of J1N1N0	Location 10	Area	300-32 Waste Site Duplicate Analysis		Duplicate Analysis		TDL	Analysis:	Location 10	Area	Sampling HEIS	no sa Wanta Sita Daniel	on from a manufacture	Durilleste Analysia		Armysia:	Duplicate of J1N1N0	Location 10	Area	300-32 Weats Sits Dupit		Duplicate Analysis		TOL	Duplicate of J1N1NO	Location 10	Sampling	300-32 Waste Site Duplicate Analysis		<b>Duplicate Analysis</b>		Taı	Analysia:	Location 10	Area	Sampling HEIS		Duplicate Analysis	TDL	Analysis:	Duplicate of J1N1N0	Area	Sampling HEIS
Difference > 2 TDL?	RPD RPD	Both > PQL?			JININO	Number	cate Analys	Difference	E.	Both > FOL?	ľ		JININO	7	HEIS NIMIN	Difference	A	Both >	1		JININI	JININO	Number	cate Analysis	Difference	Boins	11		ININI	JININO	Number	icete Analy	Difference	Bom	Both:	ľ		JININO	Number	HEIS	Differenc	Both v			JININO	Number	HEIS
> 2 TDL?	N NE	PQL7		1/9/2012	1/9/2012	Date		Difference > 2 TDL?	PPO	PQL?		11000010	1/9/2012	Date	Sample	Difference > 2 TDL?	RPD	Both >5xTDL?	PQL7		1/9/2012	1/9/2012	Sample	8.0	Difference > 2 TDL?	RPO RPO	Both > POL?				Sample	210	Difference > 2 TDL?	Both >5x1DL7	Both > PQL7		· )-	1/9/2012	-	Sample	Difference > 2 TDL7	Both >6xTDL?	PQL?		1/9/2012	Date	Sample
No - a	No-Siop	Yea (c		7.98	8.06			No - a	1000	Yes (		0.67	5.32			No-a		No-Stop	Yes (			4.96	molko		No-a		No-Stop		0.880	0.931	mg/kg		Not a	Yes (	Yes (		7000	4910	mg/kg	All	No.	No-Stop	You	1	1	-	
No - acceptable	No-Siop (acceptable)	Yes (continue)	4	3.42	+	O POL		No - acceptable	(acceptance)	Yes (continus)	2.5	6.14	2.20		Lithium	No - acceptable		No-Stop (acceptable)	continua)	2	1.71	1.76	Copen	100	No - acceptable		No-Stop (acceptable)	2	B 1.71	8 1.78	G PGL		Not applicable	(calc RPD)	Yes (continue)	5	13.0	4.45		Aluminum	No - acceptable	No-Stop (acceptable)	1 (continue)		0.199	CVg O POL	m-235, AEA
No · a	No-Stop	Yes (		406	893	movies Pot		Not a	1001	Yes (		0467	3130	mg/kg	Mac	Nota		Yes (	Yes		8.74				No-a		No-Slop		0.0621	0.0758	mo/ka Ca		No.	No-Stop	Yes		2,00	2,42		A	No.	No-Stop	Yes	0.00	5.13	pCVg	Uraniu
No - acceptable	No-Stop (acceptable)	Yes (continue)	400	342	352	Potassium		Not applicable	63%	Yes (continue)	75	94.	66.0	POL	Magnesium	Not applicable	9.6%	Yes (calo RPD)	(continue)	-	0.855	0.880	<del>1</del> ₹		No - acceptable		No-Stop (acceptable)	0.5	B 0.171		Cadmium		No - acceptable	No-Stop (acceptable)	Yes (continue)	10	0.000	0.880	Q POL	Arsenic	No - acceptable	No-Stop (acceptable)	Yes (continue)	-	0.164	DO POL	m-238, AEA
No	Yes	Yea		319	335			No	163	Yes		122	232	mg/kg		No		ĭg.	× ×		Н	16300			NO.	Yes	Yes		H	3870	+		*	Yer	Ye	1	33.1	-	H		₹.	No-Si	Ye	H	16.1	рСИ	-
Not applicable	Yes (calc RPD)	Yes (continue)	2		4	Silicon		Not applicable	Tes (Case Men)	Yes (continue)	5			0	annanna a	Not applicable	9.6%	Yes (caic RPD)	Continue	n		•	iron		Not applicable	e (calc RPI	1al	100	I	1	Calcium		Not applicable	Yes (calc RPD)	Yes (continus)	10			٥	Barium	No - acceptable	No-Stop (acceptable)	10 Yes (continue)			٥	Gross alpha
	9	٦		1.71	178	3			,			4.27	4.40	8				9			17.1	17.6				9	٩		85.5	0.88	2	ľ		9	9		0.427	0.440	PQL		ě	abie)	9	4.90	3.88		
No - ac	No-Stop (	Yes (c		119	130 P	102		No-ac		No-Stop (		0.257	0.450	modea	Mobile	No - ac		No-Stop	Yan Ir		3.37	3.54			Not a	Yes (c	Yes (c		6.51	7.14	Chr		No. a	No-Stop	Yes (		0.216	0.225		Pa	No-a	No-Stop	Year	0.01	20.9	pCVg	Gro
No - acceptable	No-Stop (acceptable)	Yes (continue)	8	42.7	-	- 3		No - acceptable		No-Stop (acceptable)	2	H	8 1.76	O POL	dans	No - acceptable		No-Stop (acceptable)	O Complete		0.427	0.440	┨		Not applicable	Yes (calc RPD)	Yes (continue)		0.171	0.176	Chromium	- Demandoon	No - accentable	No-Stop (acceptable)	Yes (continue)	0.5	0.171	Н	a POL	william.	No - acceptable	No-Stop (acceptable)	15	0.07	5.74	1 1	Gross bets

Originator:	N. K. Schiffern	Date:	1/28/2013	Calc. No.	0300X-CA-V0167	Rev.:	
	300 Area Field Remediation	Job No:	14655	Checked:	I B Berezovskiy		1/20/00/1
Subject:	300-32 Waste Site Relative Perce Carcinogenic Risk Calculations	nt Difference (I	RPD) and Dir	ect Contact Ha	azard Quotient and	Date:	1/28/2013 7 of 7

Sampling	HEJS	Sample		Uraniu	m	J	/anadli	m		Zinc		1		
Area	Number	Date	mg/kg	Q	PQL	mg/kg	10	POL	mq/kg	Q	POL		H - Motor	
Location 10	JININO	1/9/2012	15.3		0.121	43.3		2.20	36.7	+ -	8.80	ug/kg	a	POI
Duplicate of J1N1N0	J1N1N1	1/9/2012	9.02		0.121	39.7	1	2.14	31.6	+		4930	J	1000
Analysis:		60 TARWE	- C - I - C - C - C - C - C - C - C - C					4.17	31,0	_	8.55	4370	1 1	1010
	)L		The same of	1	100 - 300		2.5		1	-		1		
	Both	> PQL?	Yes	(cont	inue)	Yes	(conti	num)	Von	(contin	- Inch	11 0	5000	
Duplicate Analysis	Both >	5xTDL?	Yes	(cate	RPD)		(calc l			(calc F		No-Sto	эр (ассер	rtable)
Dobrodio Ampiyota	P	PD		51.6%	-	1	11.2%		100	14.3%	PU)	-		
		e > 2 TDL?	Not	applic	able	No	t applic	hle	Mad	applica		-		
300-32 Waste Site Dupl	icate Analy	ais	111111		-		таррио		1 1401	appinca	DIB	No.	accepta	ble
Sampling	HEIS	Sample		Chloric	la		Nitrata		Nitroge	n in Nit	rite and	Ace	naphthe	ne
Area	Number	Date	mg/kg	Q	POL	mg/kg	To	POL	mg/kg	Q	POL			110
Location 10	J1N1N0	1/9/2012	2.0	В	4.7	8.5	J	4.7	2.23	u		ug/kg	a	POL
Duplicate of J1N1N0	J1N1N1	1/9/2012	2.0	В	4.7	8.7	J	4.7		-	0.47	6.11	J	3.35
Analysis:		N7 SC-97 SAM			7.0	1 0.7	1 0	4.7	2.11		0.47	22,4	J	3.28
OT	L			2			2.5							200
- 1	Both >	POL?	No-Sto		(aldetos	Van	(conti		<del>  ,,</del>	0.75 (contin	1000		100	
Duplicate Analysis	Both >	5xTDL?		1,	pad.o,		p (acce						(continu	
Dupicate Analysis	R	PD	100	3		110 010	p (acco	DIEDIGI	No-Stor	) (accel	rabie)	No-Slo	p (accept	table)
	Difference	>2 TDL7	No -	ассері	able	No.	accept	able	-					
00-32 Waste Site Dupil	cate Analys	ota				140	accept	able	No-	accepta	ible	No-	acceptat	ole
Sampling	HEIS	Sample	Benz	o(a)py	rene	-	hrysen		T 500					
Area	Number	Date	ug/kg	a	PQL	ug/kg	Q	PQL	ug/kg	oranthe Q			ohthalen	
Location 10	JININO	1/9/2012	1.36	J	3.39	1,14	13	3,39	59.6	-	PQL	ug/kg	a	POL
Duplicate of J1N1N0	J1N1N1	1/9/2012	1.33	1	3.28	0.903	J	3.28	3.71	-	3.39	3.88	J	3.39
Analysis:				-		0.000	101	3.20	3./1		3.28	3.17	J	3.28
TO	-			15			100			50			405	_
	Both >		No-Stop	(acce	ptable)	No-Sto	o (accer	(aldste	Yes	contini	in)	No Otes	100	
Duplicate Analysis	Both >8								No-Stop			140-010	(accept	able)
	FIF		C 02 - 0 8V	9		to the last		-	140-010	(accep	iable)			
	Difference		No - 1	accept	able	No-	accept	ble	No.	accepta	hie	No.	acceptab	
00-32 Waste Site Duplic		ig		10.	P. 1981	23000000				Accepta	UNO I	140 - 1	эссерию	10
Sampling	HEIS	Sample	Pher	anthr	ene		yrene		Arry	lor-124		-	clor-1254	
Area	Number	Date	ug/kg	0	PQL	ug/kg	OI	POL	ug/kg	Q	PQL	ug/kg	Q	POL
Location 10	J1N1N0	1/9/2012	1.20	J	3.39	1.48	J	3.39	18.1	-	13.4	121	-	
Duplicate of J1N1N0	J1N1N1	1/9/2012	1.15	J	3.28	1.25	1	3.28	36.5		13.4	146	-	13.4
Analysis:	2.1163	B 2 2 2 2 4 1					-			- 1	13,4	140		13.4
TOL				50			50			16.5			16.5	_
	Both >		No-Stop	(accep	otable)	No-Stop	(accep	table)	Yes (	continu	101		continue	
Ouplicate Analysis -	Both >5			_				19	No-Stop	(accept	abia)		calc RPE	
-	RP						1 188			- 10 m	-		8.7%	
0-32 Wasta Site Duplic	Difference	> 2 TDL7	No - a	ccepts	ble	No-	eccepta	ble	No-a	cceptat	ite		oplicable	
Sampling Sampling	HEIS T					5%	- 02		0.50	-	-			
	Number	Sample		for-12										
		Date 1/9/2012	ug/kg	Q	PQL									
			25.7	_	13.4									
Analysis:	J1N1N1	1/9/2012	28.1		13.4									
TDL														
TUL	Dark :	2010		16.5										
	Both > F			contin										
Duplicate Analysis	Both >5)	CIUL?	No-Stop	accep	table)									
	RPI													

1 2

# CONCLUSION:

The calculations in Tables 1 and 2 demonstrate that the 300-32 waste site meets the requirements for the residential direct contact hazard quotients and carcinogenic (excess cancer) risk and RPDs, respectively, as identified in the RDR/RAWP (DOE-RL 2009). The hazard quotients and carcinogenic (excess cancer) risk and RPD calculations are for use in the RSVP for this waste site.

Number   Date	Sample Location	HEIS	Sumple	Ame	Americium-241	1-241	Bisn	Bismuth-214 Cesium-137 Cobalt-60	14	Ces	Cesium-137	7	ပိ	Cobalt-60	0	Eus	Euronium-152	152	Fare	Furonium, 154	15.	Line	-	331
ININIA   1972012   0.054   U   0.055   0.054   U   0.035   U   0.035   U   0.035   U   0.010   U   0.100   U   0.150   U   0		Namber	Date	pCI/g	0	MDA	pCi/g	0	MDA	pCI/g	_	MDA	DCI/g	c	MDA	nCi/e	c	MDA	of the	0	MADA	1	6	
11   11   12   12   12   12   13   14   15   15   15   15   15   15   15	Location 10	JININO	1/9/2012	0.054	n	0.054	0.466		0.075	0.034	+-	203	0.038	=	0.038	0 10	1	0.01	0.126	1	MUM	No.	7	ALDA S
11   11   12   12   12   12   13   14   15   15   15   15   15   15   15	Duplicate of JIN1N0	ININI	1/9/2012	0.116	ח	0.116	0.410		0.052	0.023	-	5000	0.005	=	0005	7900	F	0.064	0000		0000	616	):	5
INIMA   1952012 0.053	Location 1	JINIMI	1/9/2012	0.157	0	0.157	0.408		0.054		+	+	5000	=	2000	1870	=	0.00	0.004		0.034	0.090	> :	0.090
INIMA   19/2012   0.287   U 0.288   0.370   0.004   U	Location 2	JINIM2	1/9/2012	0.053	n	0.053	0.408		0.054		+-		0.032	=	0.020	0.00	-	5000	Cau.u	5	CSULUS	0.089	<b>5</b> !:	0.089
HINIMA   19/2012   C1088   U   C1088   C1091   U   U   U   U   U   U   U   U   U	Location 3	JINIM3	1/9/2012	0.287	ח	0.287	0.370	1	9200	T		1041	0.047	=	7000	0000	2	6000	0.107	);: 	0.00	0.077	0	0 077
11N1MS	Location 4	JINIM4	1/9/2012	0.088	-	0.088	0.392		0.046	1	1	1019	0 000		100	0.050	=	0.000	0.00		10.03	0.124	> :	0.124
ININMS	Location 5	JINIMS	1/9/2012	0.107	ם	0.107	0.406		0.059	0.030	-	030	0.032	+	0.032	0.000	9	0.000	0.00	+	200	0.0/8	ء د د	0.078
INIMA   1/02012   0.053   0.440   0.056   0.028   0.0   0.028   0.073   0.073   0.073   0.089   0.073   0.089   0.003   0.00	Location 6	JINIM6	1/9/2012	0.043	n	0.043	0.405		0.055	0.028	-	3.028	0.033	-	0.033	0000	=	0000	5110	+	5 5	0.079	> =	0.079
10   10   10   10   10   10   10   10	Location 7	JINIM7	1/9/2012	0.053	n	0.053	0.440		0.046	0.028			0.028	+	0.028	0.073	=	0.073	0.00	1	0000	2000	5	700
INIMA   1/02012   0.167   U 0.167   0.428   0.068   0.023   U 0.025   U 0.025   0.064   U 0.054   0.069   U 0.019	Location 8	JINIM8	1/9/2012	0.049	U	0.049	0.385		0.047	0.025		-	0.030	n	0.030	0.050	=	0.050	0.10	+	2010	2000	oj:	0.000
ININA   1/10/2012   0.109   U   0.109   0.401   0.005   0.0036   0.0036   U   0.0037   U   0.0037   U   0.0037   U   0.0037   U   0.0038   U   0.0039   U   0.0	Location 9	JINIM9	1/9/2012	0.167	n	0.167	0.428		0.048	0.023	ח		0.025	=	0.025	0.064		0.00	0.00		3000	7/000	01=	0.072
11   12   12   12   13   14   15   15   15   15   15   15   15	Location 11	JININ4	1/10/2012	0.109	ח	0.109	0.403		190.0	0.036	)	-	0.037	12	0.037	9200	=	9200	1210	+	1010	0000	=	2000
INING   1/102012   0.044   0.503   0.062   0.030   0.0305   0.030   0.003   0.003   0.003   0.004   0.004   0.004   0.004   0.004   0.005	Location 12	JININS	1/10/2012	0.111	ח	0.111	0.411		0.049	0.020	:D	+	0.023	=	0.073	0.058	=	0.050	0.069	=	0 000	260.0	9	2000
INING   1/10/2012   0.125   0.135   0.136   0.0156   0.056   0.0066   0.135   0.135   0.131   0.039   0.138   0.149   0.086   0.0066   0.135   0.131   0.149   0.086   0.0066   0.135   0.131   0.149   0.089   0.138   0.149   0.086   0.0066   0.135   0.140   0.1	Location 13	JININ6	1/10/2012	0.044	ח	0.044	0.503		0.062	0.030	-	+	0.033	=	0.033	0 080	=	0000	0117	) )  -	00.00	5000	2	5000
ININB   1/10/2012   0.110   U   0.110   0.307   0.199   0.086   U   0.086   U   0.0075   U   0.075   U   0.031   U   0.231   U   0.239	Location 14	JININ	1/10/2012	0.125	n	0.125	0.358		0.126	0.050		-	9900	-	0.066	0.135	=	0.135	1010	+	1010	0.136		0.130
The tables in this anathment.  The Leavison 15 unlarveere additional computation and was reampted.  Rev. No. 10 0.239 10.218 10 0.239 10.239	Location 15	NININ8	1/10/2012	0.110	n	0.110	0.307		0.199	0.086	-	+	5000	+	2700	1200	-	0 331	0220	+	2000	00.00	5	0.130
Attachment abkinomi censcination and was resempled.  Location 13 underwent abkinomi censcination  Responded  Q equalifier  Q equ	unyme and reares apply to a	Il of the tables in	this attachment.								4			1	0.000	10.0		0.231	0.439	-1	U.239	0.218	=	0.218
Attachment additional temodiation and was resumpled.  Just a description of the considered acceptable values.  Respected  Occupation could be acceptable values.  Respected  Occupation could be acceptable values.  Respected  Occupation of the considered acceptable values.  Occupatio	ty cells indicate not applic.	uble.																						
Attachment a considered acceptable radius.  R arejected  Q = qualifier  QC = quality control.  SVOA = semivolatile organic analysis  TH = total petroleum hydrocarbon  U = analysis organic analysis  VA = semivolatile organic analysis  VA = semivol	te to RAG exceedance for T	TPH, Location 15	Sunderwent addit	ional remodiu	but noil	was neample	-3																	
Attachment   Attachment   Sheet No.	ie: Data qualified with B, C,	andior I are con.	side red acceptabil	c values.		3																		
Rev. No. Originator N. K. Schiffern VII. Schiffern No. Originator N. K. Schiffern VII. Date Calc. No. Originator No. Originato	a detected but below the rep	xorting limitm ec	suff is an estimate	d concentration	on.											Artes	den my		-		30.5			9
Q = qualifier  Q = quality control.  QC = quality control.  SVOA = semicy control.  TPH = total perioderm hydrocarbon  U = majority control.  VA = welvelt control for minimizer of the contro	np = composite						-	3 =reject	led.							Pico.	"inologia	N	Colition	K.		Sheet No.		9 10
OC equality control.  SVOA = semivolatile organic analysis  Calc. No. 0300X-CA-V0167  Rev. No. 0300X-CA-V0167  Nev. No. 0400X-CA-V0167  No. 0300X-CA-V0167  Nev. No. 0400X-CA-V0167  No. 0400X-CA-V0167  Nev. No. 0400X-CA-V0	result reported from a dilut	Tion					2	Jenn=(	tier							5 0	Sandard .	4 6	SCHOOL T	Ť	2	Date	- 1	71/8
SVOA = semivolatife organic analysis  TPH = total petroleum hydrocarbon  U = analysis for multi-content  Voa = serielis content analysis	IS=Hantord Environmental	Information Syst	lesn					C = gua	div control							ع ر	In Min	VOOCO	ACCUSA VOL	Ĭ,	S	Dale	1	100
abons	estimated						50	= VOA	semiwatile	oneanic ana	Vois					3		V.M.V	-V2-V0	ا		Kev. No.		=
uhons	A = minimum detected axi	ivity					-	PH=to	and petroleun	disconfu n	. 5													
	4 = polycyclic aromatic hyd.	Incurbons					3	James!	red for and	ax detected.									•					
	8 = polycchionnated byphen	пудз					,	10A = V	al-dile Action	o desplace														

Deciminary   Thinks   Page   Color	Sample Location	HEIS	Sample	7	Lead-212		Pofas	Potassium-40		Rudium-226	m-226	Radi	Radium-228	Ē	Thorium-228	80	Thorium-232	ım-232	Urani	Uranium-233/234
JININI   1970012   0.1979   0.007   18.8   0.1546   0.1545   0.1071   0.1070   0.1041   0.1070   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1070   0.1071   0.1		Number	Date	NO N	-	MDA	S Od	7				pCi/g		-		MDA	-		pCi/k	
NINNM   197012   0.049   0.059   15.2   0.212   0.299   0.013   0.014   0.016   0.016   0.019   0.014   0.014   0.01	Location 10	1	1/9/2012	0.979		0.057	19.8	0	-	453	0.073	0.853	0.167		$\vdash$	0.055	0.853	0.167	2,60	1
	plicate of JININO	_	1/9/2012	0.700		0.037	16.2	0.	-	398	0.051	0.700	0.114	H		9600	0.700	0.114	3.10	9
	Location	IMINIS	1/9/2012	0.640		0.034	15.7	0.7	_	396	0.052	0.624	0.107	-		0.033	0.624	0.107	3.70	6
NIMMA   1992  0.555   0.054   1.57   0.038   0.339   0.073   0.0250   0.0	Location 2	JINIM	1/9/2012	0.548		0.038	15.8	0.7	-	396	0.053	0.594	0.147	⊢		0.036	0.594	0.147	2.70	0
INIMA   199202   0.584   0.001   16.1   0.235   0.334   0.004   0.578   0.005   0.519   0.51	Location 3	JINIM3	1/9/2012	0.532		0.047	15.7	0	_	359	0.073	0.620	0.159	+		0.045	0.620	0.150	2	-
ININIA   19/2012   0.549   0.049   15.5   0.023   0.934   0.057   0.641   0.647   0.044   0.055   0.049   0.054   0.049   0.049   0.054   0.049   0.054   0.049   0.054   0.049   0.054   0.054   0.049   0.054   0.	Location 4	JINIM4	1/9/2012	0.560		0.031	16.1	0	H	380	0.04 440.0	0.578	960.0	-		0.030	0.578	960'0	91	-
ININIMA   19/2012   0.259   0.454   0.655   0.645	Location 5	JINIMS	1/9/2012	0.540		0.040	15.5	0.7		394	0.057	0.541	0.147	1		0.039	0.541	0.147	P	-
JINIMR 1972012 0728	Location 6	JINIM6	1/9/2012	0.804	_	0.045	17.9	0	H	38	0.053	0.603	0.146	-		0.043	0,603	0.146	3.62	0
11NIMS   192012   0.238   0.049   154   0.029   0.047   0.049   0.047   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.044   0.049   0.04	Location 7	JINIM7	1/9/2012	0.639		0.043	16.2	0.2	H	427	0.044	0.635	0.121	₽		0041	5890	1010	3.85	6
ININING   192012   0.644   0.029   6.60   0.056   0.064   0.056   0.053   0.053   0.0742   0.094   0.055   0.055   0.055   0.075   0.055   0	Location 8	JINIM8	1/9/2012	0.728		0.049	15.4	0.7		374	0.045	0.570	0.143	╀		0.047	0.570	0.143	80	6
ININIA   I/IO2012   0.457   0.036   14.8   0.18   0.18   0.059   0.050   0.1	Location 9	JINIM9	1/9/2012			0.039	16.0	0.2		416	0.047	0.742	0.094	-		0.037	0.742	0.094	3.36	0.0
11NINS   1/10/2012   0.6458   0.0466   6.650   0.179   0.146   0.6868   0.0460   0.7722   0.0766   6.655   0.171   0.146   0.6868   0.046   0.7722   0.1722   0.1722   0.171   0.146   0.6868   0.046   0.1722   0.1722   0.1722   0.171   0.1722	Location 11	NINI V	1/10/2012			0.038	14.8	0.3	-	389	090.0	0.703	0.130	-		0.036	0.703	0.130	151	
Thinks   1/10/2012   0.6357   0.0402   19.6   0.3377   0.488   0.0660   0.7732   0.146   0.6669   0.1702   0.0568   0.1050   0.172   7.32   1.1111144   1/10/2012   0.6451   0.199   1.35   0.589   0.189	Location 12	JININS	1/10/2012			0.036	16.0	0		399	0.047	0.632	0.076	-		0.035	0.632	9200	605	0
11/11/11/11   1/10/2012   0.645   0.070   12.5   0.580   0.037   0.122   0.586   0.072   0.588   0.050   0.173   1.02   0.383   2.33       11/11/11/11   1/10/2012   0.041   0.179   1.04   0.179   1.04   0.173   1.02   0.048   0.	Location 13	JININ6	1/10/2012			0.042	9.61	0.3		488	090'0	0.732	0.146	-		0.040	0.732	0.146	0.605	0
HEIS   Sample   Cranlium-235   Grant   Grass applie   Cranlium-235   Grass applie   Gross appl	Location 14	JININ	1/10/2012	0.525		0.070	12.5	0.5		347	0.122	0.506	0.172	-		0.068	0.506	0.172	7.32	0
HELS   Sample   Uranlum-235 AEA   Uranlum-236 AEA   Uranlum-236 AEA   Uranlum-236 AEA   O   O   O   O   O   O   O   O   O	Location 15	NINI NINI	1/10/2012	0.641		0.179	13.6	0.8	-	298	0.193	7.02	0.383	-		0.173	1.02	0.383	2.23	0
Number   Sample   Cross alpha   Cross alph		No.																		
Number   Date   Date   DC/g   Q   MDA   DC/g   Q   Q   Q   Q   Q   Q   Q   Q   Q	ample Location	HEIS	Sample	Ora	nium-2	35	Uranium	-235, AE		Uranh	m-238	Urantum	1-238, AEA		ross alpha		Gross	: beta		
JINING 1972012 0.244 U 0.415 U 0.415 U 0.244 1 0.1999 4.67 U 4.67 5.13 0.164 16.1 3.88 20.9 5.74   5.07		Number	Date	PCI/g	-	MDA	PCI/g	O	-			pCI/g		-	Н	H	⊢	_		
JINIMA   1972012   0.254   U 0.254   U 0.254   U 0.224   U 0.224	Location 10	ON IN	1/9/2012	0.415	n	0.415	0.234	J 0.1	_	n 29	1 4.67	5.13	0.164				-	$\vdash$		
JINIMA   192012   0.250   U   0.254   0.195   U   0.214   440   U   440   3.29   0.177   764   3.69   14.6   5.83     JINIMA   192012   0.204   U   0.224   0.293   U   0.212   3.65   U   3.65   0.168   7.54   2.60   2.12   6.13     JINIMA   192012   0.204   U   0.203   U   0.228   2.86   U   2.86   0.064   U   2.12   0.150   U   0.203   U   0.229   2.86   U   2.86   0.064   U   0.177   6.81   3.73   17.2   5.11     JINIMA   192012   0.207   U   0.203   0.014   4.13   U   0.224   0.177   6.81   3.95   14.7   5.28     JINIMA   192012   0.197   U   0.197   0.235   J   0.247   6.13   J   0.204   0.105   U   0.205   U   0.205   U   0.205   U   0.207   U   0.207	plicate of JININO	NINIS	1/9/2012	0.254	D	0.254	0.302	J 0.2	_	38 L	1 6.98	3.56	0.173	12.0		3.38	18.5	5.07		
JINIMZ   19/2012   0.274   0 0.204   0.203   1 0.204   3.89   U 3.89   2.86   0.168   7.54   0.205   2.12   6.13     JINIMZ   19/2012   0.150   0.0204   U 0.0212   2.86   U 2.88   0.147   8.23   3.75   2.05   4.89     JINIMZ   19/2012   0.150   0.0200   U 0.201   0.202   2.86   U 2.88   0.147   8.81   3.95   14.7   5.21     JINIMZ   19/2012   0.197   U 0.203   U 0.203   J 0.224   6.13   J 0.204   J 0.205   U 0.203   J 0.224   J 0.224   J 0.225   J 0.224   J 0.	Location 1	MINIS	1/9/2012	0.250	ם	0.250	-			40 U	1 4.40	3.29	0.177	7.64		3.69	14.6	5.83		
JINIMA   19/2012   0.204   U   0.204   0.023   U   0.215   5.65   U   5.65   U   2.86   O   1.28   O   1.75   S.11	Location 2	JINIMZ	1/9/2012	0.274	n	0.274	0.293	J 0.2	_	n 68	3.89	2.86	0.168	-		2.60	21.2	6.13		
JINIMA   19/2012   0.150   U 0.159   0.0390   UJ 0.228   2.86   U 2.86   0.64   0.188   13.3   17.2   5.11	Location 3	JINIM3	1/9/2012	0.204	ດ	0.204				65 U	5.65	1.28	0.175	⊢		3.56	20.5	4.89		
11N1M5   1/9/2012   0.207   U   0.207   0.084   U   0.214   4.35   U   4.35   1.46   0.177   6.81   3.95   14.7   5.21	Location 4	JINIM4	1/9/2012	0.150	ח	0.150		-		. 86 U	1 2.86	0.6	0.188	-		3.73	17.2	5.11		
JINIM6   1/9/2012   0.203 U 0.203 U 0.204   0.134 UJ 0.204   3.71 U 3.71   3.51   0.166   11.0   3.22   2.37   5.28     JINIM8   1/9/2012   0.187   0.035   0.285   0.285   0.285   0.295   0.205   0.25   0.205   0.25   0.205   0.25   0.205   0.2	Location 5	JINIMS	1/9/2012	0.207	n	0.207				-		1.46	0.177	6.81		3.95	14.7	5.21		
11NIMA	Location 6	JINIM6	1/9/2012	0.203	n	0.203		7.0			_	3.51	0.169			3.22	23.7	5.28		
JINIMB   1992012   0.187   U   0.187   0.037   UJ   0.283   7.00   U   7.00   1.98   0.234   10.9   2.86   18.9   6.18	Location 7	JINIMT	1/9/2012	0.192	ם	0.192	0.285	1 0.2			-	3.90	0.200			4.03	17.7	5.87		
11N1M9   1/9/2012   0.273   U 0.273   U 0.280   5.39   U 5.59   3.72   0.231   12.4   3.92   2.38   4.93   4.93   11N1M8   1/10/2012   0.288   U 0.288   0.345   U 0.288   0.345   U 0.288   0.345   U 0.288   U 0.289   U 0.289	Location 8	JINIMS	1/9/2012	0.187	ח	0.187	-			-	_	1.98	0.234	10.9		2.86	18.9	6.18		
JINING   1/10/2012   0.180   U   0.180   0.0048   UJ   0.184   4.40   U   4.40   1.57   0.152   9.75   3.96   15.1   5.21	Location 9	JINIM9	1/9/2012	0.273	ם	0.273		-	_	39 U	1 5.39	3.72	0.231	12.4		3.92	23.8	493		
JININS   JIQZ012 0.258   U 0.258 0.342   J 0.201 6.47   U 6.47 5.66   16.6 18.1   3.20   23.3 5.28   S. 1	Location 11	JININA	1/10/2012	0.180	ņ	0.180	_		_	-	-	-		9.75		3,96	15.1	5.21		
JINING   U/02012   0,183   U   0,183   0,026   UJ   0,200   3,85   U   3,85	Location 12	JININS	1/10/2012	0.258	n	0.258	0.342	J 0.2	_		-	-	1			3.20	23.3	5.28		
JININ7   U102012   0.445   U   0.445   0.317   J   0.187   7.16   U   7.16   6.59   0.154   1.97   0.354   3.63   0.574	Location 13	JININ6	1/10/2012	0.183	>	0.183		Н				0.627	0.165	11.3		3.54	183	6.30		
JININB   1/10/2012   0.448   U   0.448   0.159   UJ   0.202   10.5   U   10.5   2.25   0.167   8.81   3.63   15.2   5.82    Affactment Originator N. K. Schiffern Date Calc. No. 0.000X-CA-V0167   Rev. No.	Location 14	JININ	1/10/2012	0.445	-	0.445	0.317	J 0.1				629	0.154	-	ĺ	7.354	3.63	0.574		
Sinest No.	Location 15	NINI NINI	1/10/2012	0.448	-	0.448	-	-				2.25	0.167	-		3.63	15.2	5.82		
N. K. Schiffern Date I. B. Berezovskiy Date 0300X-CA-V0167 Rev. No.														Attac	chment				Sheet No.	
I. B. Berezovskiy Date 0300X-CA-V0167 Rev. No.														O	ginator	NK	chiffern	1	Date	
0300X-CA-V0167 Rev. No.														ŭ	hecked	I. B. Be	rezovskiy	ĺ	Dale	
2010														ਹੈ	Ic. No.	0300X-C	74-V0167	-	Rev. No.	1

Number   Date   Barbol   Color   Col	Sample Location	CT I	ormpie	₹	Aluminum	E	AB	삵	1	AC	의		Barion	000	1	Beryllium	6		Boron		Cad	Cadmium
Minishi   Mazili   480   440   0.338   W   0.538   244   0.450   0.4	01	Number	Date	+	9	POL	ung/kg	-	POL	$\dashv$	0		-	_		0	PQL	mg/kg	-	+	ng/kg	0
1411MIN   14702012 4650   4.47   0.451   1.0   0.451   1	Location 10	ON IN	1/9/2012	+		4.40	0.528	-1	0.528	2.42	0.		59.5	0.440	Н		0.176	0.931	L	┢	+	+
NINING   1972012   4790   476   476   477   478   479   47	Suplicate of JININO	NIN I	1/9/2012	4		4.27	0.513	2000	0.513	2.06	0.	-	53.1	0.427	-		0.171	0.880	1	+	+	╁
NINING   1982012   5800   4446   0.535   10   0.535   2.53   0.895   6844   0.216	Location 1	INIM	1/9/2012	_		3.76	0.452		0.452	1.93	0	-	51.8	0.376	+		0.151	3.63	-	+	+	+
NINING   1042012   4500   4510   45	Location 2	JINIM2	-	-		4.76	175.0	-	0.571	3.84	0,0		18.4	0.476	+		0610	2 58		+	-	+
11111144   1470012 4010   1450   14	Location 3	JINIMB	-			4.46	0.535	-	0.535	2.83	0.2	-	12.7	0.446	+		0.178	0.815	+	+	+	+
MINIMA   19/2012   4010   10   10   10   10   10   10	Location 4	JINIM4	_	_		3.71	0.445	$\vdash$	0.445	2.93	0	-	11.3	0.371	-		8710	0.655	+	+	-	+
Thin May 19/2012   4810   48	Location 5	JINIMS	1/9/2012			3.93	0.471	-	0.471	2.12	0	+	7	0.393	+		0.157	0614	+	+	+	+
INNINA   1962012   4510   455 0   45	Locarion 6	JINIM6	1/9/2012			4.71	0.566	-	0.566	2.75	0.0	-	10.4	0.471	+		0 1 0	36	+	+	+	+
NINIMA   192012   4810   3460   0.432   U   0.432   2.34   0.720   66.5   0.136   0.144   0.765   B   1.44   0.0401   B   1.84   0.150   B   1.85   0.150   B   1.8	Location 7	MINIC	1/9/2012			4.63	0.556	+	0.556	2.51	0.0	+	20	0.463	+		0.105	101	+	Ť	+	+
Thinky   1950012   8870   893   0472   U   04612   278   0.1786   618   0.239   0.233   0.157   174   B   1.75   0.045   B   1.75   0.107   B   1.75   B   1.75	Location 8	JINIM8		-		3.60	0.432	+-	0.432	2.34	0	+	0.3	0.360	╁		0.144	276.0	+	+	+	+
Tinnia   Virgori   SSO   SSO	Location 9	9MINIT		-		3.93	0.472	╄	0.472	278	0	+	100	0.303	+		100	20.70	+	+	1	+
JINING   1/10/2012   5520   4.52   0.555   1/10   0.519   2.45   0.685   6.55   0.475   0.475   0.475   3.44   1.75   0.465   0.555   1.85   0.685   8   1.75   0.485   0.485   0.554   1.85   0.685   8   1.85   0.68	Location [1]	NINI ANINI	1	-		5.08	0.610	+	0190	260	-	+	47	0.500	+	1	0.137	47.1	+	+	+	Ť
Height   Height   Sample   Asia   October   October	Location 12	SNINIS	1/10/2012	_		4.32	0.519	╁	0150	243	Š	+	35	0.432	+		C. C. C.	07.7	1			-
Minima   M	Location 13	JININ6	1/10/2012			4.63	0.555	╁	0.555	2.29	50	+	37	0.463	+	-	0.105	0.000	+	+		+
Holio   Holi	Location 14	TNINI	1/10/2012			5.12	0.615	$\vdash$	3,615	2.64		╀	5.7	0512	+	I	0.00	1 60	+		1	+
HELS   Sample   Calcium   Chromium   Chrom	Location 15	NININ	1/10/2012			4.45	0.534	-	H	2.30	0.8	-	7.3	0445	+	-	0.178	4 87	+	+	+	Ť
HEIS   Sample   Calcium   Calcium	Equpment Blank	SNINIS	1/10/2012	L		472	0 566	╁	+	+	+	+	2	0.510	+	:	200	107	+	+	+	Ť
HEIS   Sample   Calcium   Chromium   Cobuit												1			1	3	1	2	4	+	+	-
Minima   M	Sample Location	HEIS	Sample	3	alcium		Chris	minm		ටි	balt		Copi	per	H E	exavale	7		Iron	H	1	9
JINING   1972012   3870   88.0   7.14   0.176   4.36   1.56   9.62   0.880   0.513   0.515   14800   17.1   3.54   17.0		Tagmen	Date	mg/kg	0	POL	mg/kg	H	+	H	H	+	-	H	- Marke	3	5	A. A. C.	H	+	1	+
JININI	Location 10	JININ0	1/9/2012	3870		88.0	7.14	$\vdash$	+	1-		+	+-	╀	0.50	-	+	16300	7	+	4	+
INIMIM   1992012   4170   55.3   941   0151   4.69   1.51   13.6   0.733   0.51   1 0.051   14700   15.1   14.6   11.1   11.0   11.1   14.6   11.1   11.1   14.6   11.1   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.6   11.1   14.8   14.6   11.1   14.8   14.6   11.1   14.8   14.6   11.1   14.8   14.6   14.8   14.6   14.8   14.6   14.8   14.6   14.8   14.6   14.8   14.6   14.8	plicate of JININO	ININI	1/9/2012	3560	-	85.5	6.51	-	171.0	4.62	-	$\vdash$	74	0.855	0.51	=	150	14800	1	+	5	5 0
JINIMA   1972012   4870   952   8.33   0.199   4.97   1.90   12.1   0.952   0.51   1.0   0.51   1700   19.0   5.45     JINIMA   1972012   6490   74.2   5.73   0.148   4.65   1.78   8.34   0.882   0.51   0   0.51   15600   17.8   3.05     JINIMA   1972012   6490   78.6   5.48   0.147   3.87   1.57   7.26   0.780   0.51   0   0.51   15000   14.8   2.50     JINIMA   1972012   6350   94.3   6.85   0.189   4.62   1.89   9.26   0.943   0.51   0   0.51   17000   18.5   2.50     JINIMA   1972012   5870   7.20   5.38   0.144   44.5   1.44   11.2   0.720   0.51   0   0.51   17000   18.5   4.23     JINIMA   1972012   5870   7.24   0.20   2.54   2.00   0.51   0   0.51   17000   18.5   4.23     JINIMA   1972012   6190   78.6   6.82   0.157   5.32   1.07   0.185   0.952   0.107   0.185   0.189   0.185   0.184   0.185   0.1	Location /	JINIMI	1/9/2012	4170		75.3	9.41	-	151.	4.69	-	-	3.6	0.753	0.51	=	0.51	14000	-	+	46	5 6
JINIMG   192012   5640   882   631   0.178   4.65   1.78   8.34   0.892   0.51   U   0.51   15600   1.78   3.03     JINIMG   192012   6950   74.2   5.13   0.148   4.02   1.48   1.16   0.15   1.4000   1.48   2.50     JINIMG   192012   6950   78.6   5.48   0.118   4.02   1.89   9.26   0.943   0.51   U   0.51   1.3000   18.9   5.25     JINIMG   192012   3870   92.7   7.07   0.185   5.06   1.89   1.12   0.72   0.51   U   0.51   1.5000   18.9   4.25     JINIMG   192012   3870   2.23   0.144   44.5   1.44   1.12   0.72   0.51   U   0.51   1.5000   1.57   4.25     JINIMG   192012   3870   2.2   3.38   0.144   44.5   1.12   0.72   0.51   U   0.51   1.5000   1.57   4.25     JINIMG   192012   5.60   1.02   1.24   0.203   5.54   2.0   0.52   U   0.52   1.6000   1.57   4.25     JINIMG   1102012   5.60   5.67   0.18   0.18   4.55   1.78   1.15   0.52   0.53   U   0.52   1.6000   1.57   4.25     JINIMG   1102012   5.60   5.80   0.17   5.23   1.78   1.15   0.52   0.53   U   0.52   1.6000   1.57   4.25     JINIMG   1102012   5.60   5.80   0.17   5.23   1.78   1.15   0.52   0.53   U   0.52   1.6000   1.57   4.25     JINIMG   1102012   5.60   5.80   0.17   5.23   1.78   1.15   0.52   0.53   U   0.53   1.500   0.52   0.53   U   0.53   1.500     JINIMG   1102012   5.60   5.80   0.11   5.20   0.52   U   0.52   0.53   U   0.53   1.500   U   0.53   1.500   U   0.54   U   0.54   U   0.54   U   0.54   U   0.55   U   U   U   U   U   U   U   U   U	Location 2	JINIM2	1/9/2012	4870		95.2	8.33	۲	81.0	4.97	=	H	2.1	0.952	0.51	=	0.51	00771	=	+	2 4	5 0
JINIMA   19/2012   6150   74.2   57.3   0.148   4.02   1.48   7.16   0.742   0.51   0   0.51   14000   14.8   2.50     JINIMA   19/2012   6350   78.6   5.48   0.157   3.87   1.57   7.26   0.786   0.51   0   0.51   13000   15.7   2.50     JINIMA   19/2012   6350   94.3   6.85   0.189   4.62   1.89   9.26   0.943   0.51   0.51   13000   15.7   2.50     JINIMA   19/2012   3870   92.7   7.07   0.185   5.06   1.85   10.1   0.972   0.51   0   0.51   15000   14.4   3.14     JINIMA   19/2012   4190   78.6   6.82   0.144   4.45   1.12   0.786   0.51   0   0.51   16.00   1.7   4.23     JINIMA   19/2012   4190   78.6   6.82   0.157   4.75   1.13   0.78   0.52   0   0.52   18.00   1.5   4.23     JINIMA   19/2012   5.60   86.5   7.46   0.187   4.76   1.73   0.78   0.52   0   0.52   18.00   1.8   3.18     JINIMA   19/2012   5.60   86.5   7.46   0.185   5.49   1.8   8.90   0.925   0.53   0.53   0.53   1.8   0.53   1.8     JINIMA   19/2012   5.60   8.90   6.98   0.178   5.35   1.78   1.16   0.890   0.52   0.53   1.8   0.50   1.8   4.29     JINIMA   19/2012   5.60   8.90   6.98   0.18   5.35   1.78   1.16   0.890   0.53   1.8   0.944   0   0.944	Location 3	JINIM3	1/9/2012	5640		89.2	6.31	۲	1.178	4.65	-	+	34	0.892	0.51	=	0.51	18600	1	+	2 8	5 0
JINIMS   192012   6850   78.6   54.8   0.157   3.87   1.57   7.26   0.786   0.51   0   0.51   13000   15.7   2.50   1101MM   192012   5870   92.3   0.189   4.62   1.89   9.26   0.943   0.51   0.51   13000   18.5   2.59   1101MM   192012   5870   72.0   2.38   0.144   44.5   1.4   11.2   0.720   0.51   0   0.51   17000   18.5   4.23   1.0	Location 4	JINIM4	1/9/2012	6150		74.2	5.73	-	7.148	4.02	-	-	9	0.742	0.51		150	4000	-	+	3 6	5 0
JINIMG   1972012   61350   943   6.85   0.189   4.62   1.89   9.26   0.943   0.51   0   0.51   15900   189   5.59     JINIMG   1972012   3870   72.0   5.38   0.144   445   144   11.2   0.720   0.51   0.151   17200   14.4   3.14   3.14     JINIMG   1972012   3870   72.6   6.82   0.144   445   144   11.2   0.720   0.51   0.151   15100   14.4   3.14   3.14     JINIMG   1972012   3800   102   7.24   0.203   5.54   2.03   10.9   1.02   0.52   18000   2.03   13.4     JINIMG   1/102012   5.40   0.152   4.98   1.85   8.90   0.952   0.53   0.53   18000   1.78   4.29     JINIMG   1/102012   5.60   5.90   6.98   0.118   5.35   1.78   11.6   0.890   0.53   1.800   1.78   4.29     JINIMG   1/102012   3.53   B 94.4   0.189   U 0.189   1.89   U 0.944   U 0.94	Location 5	JINIMS	1/9/2012	6950		78.6	5.48	۲	751.0	3.87	-	-	.26	0.786	0.51	12	0.51	13000	-	1	100	!
JINIMA   1972012   5870   92.7   7.07   0.185   5.06   1.85   10.1   0.927   0.51   U   0.51   17200   18.5   4.23   1.2   11.0   1.0	Location 6	JINIM6	1/9/2012	6350		94.3	6.85	1	1.189	4.62	=	H	26	0.943	0.51	D	0.51	00651	1	-	20	1
JINIMB   1992012   3870   72.0   53.8   0.1144   44.5   11.2   0.0720   0.51   U   0.51   15100   144   3.14   1.14   1.11   1.11   1.14   1	Location 7	JINIMT	1/9/2012	5870		7.76	7.07	)	7.185	5.06	=	-	0.1	0.927	0.51	5	0.51	17200	=	+	23	ile
JiNiM9   19/2012   4190   78.6   6.82   0.157   5.23   15.7   21.3   0.786   0.51   0. 0.51   16900   15.7   4.23   1.3	Location 8	1	1/9/2012			72.0	5.38	3	1.144	4.45	Ë	-	1.2	0.720	0.51	5	0.51	15100	7	+	14	6 0
JININA   I/102012   5460   102   7.24   0.203   554   2.03   1.05   1.02   0.52   0.052   18000   20.3   13.4	Location 9		1/9/2012			78.6	6.82	)	1.157	5.32	-	_	13	0.786	0.51	2	H	00691		H	23	ile
JININS   1/102012   6150   86.5   7.46   0.173   4.76   1.73   10.7   0.865   0.52   U   0.52   16100   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.68   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   4.29   11000   17.3   12.3	Location 11	$\neg$	1/10/2012			102	7.24	3	1,203	5.54	2.0	-	6'0	1.02	0.52	n	+	18000	20	+	3.4	
JINING   1/102012   2740   92.5   6.47   0.185   4.58   1.85   8.90   0.925   0.53   U   0.53   16900   18.5   3.19   1.10	Location 12	Т	1/10/2012			86.5	7.46	3	1.173	4.76	1.1	_	0.7	0.865	0.52	n	+	00191	-	+	48	0
JININ7 1/102012 5780   102	Location   3		1/10/2012			92.5	6.47	9	1.185	4.98	1.2		06	0.925	0.53	2	╁	00691	1	+	10	i e
JININB   J/102012   6560   89.0   6.98   0.178   5.53   1.78   11.6   0.890   0.53   U   0.53   15800   17.8   4.29	Location 14	$\neg$	1/10/2012			102	7.47	2	1,205	5.49	2.0		6.0	1.02	0.52	n	+	18100	20	+	86	1
JININ3   I/102012   35.3   B   94.4   0.189   U   0.189   1.89   U   1.89   0.944   U   0.944	Location 15	7	1/10/2012			89.0	86'9	0	1.178	5.53	-		9.1	0.890	0.53	2	-	15800	-	+	29	
N. K. Schiffen 3-6  N. K. Schiffen Date 12/1  I. B. Berezowskiy Date 12/1  O300X-CA-V0167 Rev. No.	Equpment Blank	7	1/10/2012	┙	В	94.4	0.189	n O	189	1.89	U 1.8	Н	-	Н	3		16	323	132	+	532	Ö
N. K. Schiffen Date I. B. Berezowskiy Date 0300X-CA-V0167 Rev. No														e e	Altac	hment		_		She	No.	30f.
I. B. Berezovskiy Date 0300X-CA-V0167 Rev. No.															Orig	malor	N.K.	Schiffern			Date	12/18/
0300X-CA-V0167 Rev. No.															đ	ecked	I.B.B.	rezovski	_		Date	12/18/
															S.	c. No.	0300X-	CA-V016	1	Re	No.	0

Sample Location	or .	Sample	7	Linum	٦.	Mag	틹		Man	8		Me	Mercury		Molybdenum	lenum		Nickel	2000	Po	Potassium	-
	Number	Date	mg/kg	9	ğ	mg/kg	0	POL	7	0	POL	mg/kg	Q PQL		O Solgar	POL	mg/kg	0	POL	mg/kg	0	POL
Location 10	ONINI	1/9/2012	5.32		2.20	3130		0.99	232			-	U 0.0278	$\vdash$	-	⊢	-		3.52	893	+	352
Duplicate of JININO	NNI	1/9/2012	5.27		2.14	2940		64.1	227		-	0.0264	0.0264	-	0.257 B		7.98		3.42	106	+	147
Location 1	NINE	1/9/2012	5.33		1.88	2910		56.4	228		3.76	0.0263	U 0.0263	-	0.300 B	-	7.02	L	3.01	186		105
Location 2	JINIMZ	1/9/2012	6.64		2.38	3670		71.4	261	-	-	0.0272	U 0.027	2	-	Ļ	871	L	3.81	1180		38
Location 3	JINIM3	1/9/2012	5.82		2.23	3260		6.99	297		4.46	0.0262	U 0.0262	-	0.289 B	1.78	7.63	L	3.57	870	+	357
Location 4	JINIMA	1/9/2012	5.44		1.85	3040		55.6	195	F	-	0.0271	U 0.0271		i	-	8		207	841	+	707
Location 5	JINIMS	1/9/2012	5.08		1.96	2820		58.9	181	l'	3.93	0.0270	U 0.0270	-	+		80.9	L	3.14	609		2 2
Location 6	JINIM6	1/9/2012	5.88		2.36	3150		7.07	223	-	4.71	0.0241	U 0.0241	H	+	68	6 9		3.77	850	1	1
Location 7	JINIM7	1/9/2012	6.07		2.32	3400		69.5	284		1	0.0270	U 0.0270	+	+	1	7.76	I	17.5	0101	T	12
Location 8	JINIM8	1/9/2012	5.54		1.80	2930	-	54.0	218	-		0.0236	U 0.0236	╀	+	1	09.9		2.88	885	t	286
Location 9	JINIM9	1/9/2012	5.71		96.1	3170		58.9	273		T	0.0255	U 0.0255	+-	t	1	7.73	I	3.14	000	+	PIE
Location [1]	SININA	1/10/2012	6.26		2.54	3290		76.2	281			0.0246	U 0.0246	+-	+-	F	7.59	I	4.07	1280	$\dagger$	407
Location 12	JININS	1/10/2012	6.26		2.16	3240		8.49	308	L		0.0267	U 0.0267	-	1-	Ͱ	7.22		3.46	1000	t	146
Location 13	JININ	1/10/2012	5.98		2.31	3130	8	69.4	254		4.63	0.0271	U 0.027	E	0.272 B	F	7.07		3.70	1220	t	370
Location 14	NINI	1/10/2012	623		2.56	3550		76.8	258			0.0247	U 0.0247	-	0.330 B	_	7.83	-	4.10	0111		410
Location 15	SNINIS	1/10/2012	1		223	2900		8.99	237		4,45	0.0255	U 0.0255	-	-		7.57		3.56	1090		356
Equpment Blunk	NINI	1/10/2012	2.36	n	2.36	21.4	В	8.02	6.25		4.72 (	0.0237	U 0.0237	L	U.89	1.89	3.77	5	3.77	43.2	Ø	377
	-												2	100								
Sample Location	HEIS	Sample	Š	Selenium			-	+		1		Soc	E		Uranium	non		Vanadium	2		Zinc	
	Number	Date	mg/kg	9	PQI	mg/kg	0	POL		0		mg/kg (	Q PQL	0.00	mg/kg 0	POL	mg/kg	0	POL	mg/kg	0	POL
Location 10	ONING	1/9/2012	0.264		0.264	335	1		0.176	מ		130	44	H	15.3	0.121	43.3	-	2.20	36.7	+	8.80
Duplicate of JINING	Z	1/9/2012	0.25	-	0.256	319	-	-	0.171	ם	0.171	119	42.		9.02	0.121	38.7		2.14	31.8		8.55
Location 1	NIN I	1/9/2012	0.226	5	0.226	313	-		0.151	ח	0.151	091	37.6		9.83	0.121	37.4		88.1	45.7		7.53
Localion 2	JINIMZ	1/9/2012	0.285	0	0.285	487		06:1	0.190	ם	0.190	175	47.		7.02	0.121	43.5		2.38	42.4	-	9.52
Location 3	NIW3	1/9/2012	0.268	5	0.268	437	1	-	0.178	ח	0.178	127	44.6		3.03	0.121	39.1		2.23	31.1	!	8.92
Location 4	NIM4	1/9/2012	0.222	0	0.222	337	-	-	0.148	ם	0.148	121	37.1	-	2.40	0.121	35.5		1.85	28.9	-	7.42
Location 5	SMINIS	1/9/2012	0.236	2	0.236	285		1.57	0.157	0	0.157	107	39.	_	36	0.121	32.5		-8	26.3	ļ-	7.86
Location 6	NIMO	1/9/2012	0.283	0	0.283	462		-	0.189	5	0,189	145	47.1	-	10.3	0.121	40.7		2.36	35.0	-	9.43
Location /	MINIC	1/9/2012	0.278	n	0.278	366	1	-	0.185	ם ח	0.185	150	46.3		10.6	0.121	42.6		2.32	40.7		9.27
Location 8	NIMB	1/9/2012	0.216	5	0.216	261		-	0.144	0 0	0.144	===	36.0	-	5.89	0.121	37.5		08:	35.0	-	7.20
Location 9	JINIM9	1/9/2012	0.236	5	0.236	332		-	0.157	n o	0.157	142	39.	H	9.75	0.121	41.9		1.96	43.6	-	7.86
Location 11	Z	1/10/2012	4	-	0.305	642			0.203	o n	0,203	139	50.8	H	4.55	0.121	43.6		2.54	43.3		10.2
Location 12	JININS	1/10/2012	_	Þ	0.259	442				U 0	0.173	17.1	43.2		17.9	0.121	40.4		2.16	42.5		8.65
Location 13	9NIN	1/10/2012	_	ם	0.278	410		-	0.185	0 0	0.185	114	46.3		1.54	0.121	4.14		2.31	32.8		925
Location 14	NIN	1/10/2012	_	ח	0.307	619		2.05	0.205	U O	0.205	278	51.2	H	21.4	0.121	45.2		2.56	39.4		10.2
Location 15	NINS NINS	1/10/2012	0.267	2	0.267	336		-		U 0	0.178	791	44.5		6.23	0.121	40.5		2.23	41.2	r	8.90
Equipment Blank	JININ3	1/10/2012		5	0.283	182		1.89	0.189	0 0	0.189	47.2 L	J 47.2	2	0.00		0.407	8	2.36	1.37	8	9.44
														¥	Attachmen		-		S	Sheet No.	4 of 16	9
															Originator		N. K. Schiffern	ε		Date	12/18/12	3/12
															Checked		l. B. Berezovskiy	kiy		Date	12/18/12	212
															Calc. No.		0300X-CA-V0167	167		Rev. No.	0	
																ı	-		400			

Sample Location	Mumber	Sample	Ħ	TPH - Diesel	sel	HAL	IPH - Motor oil	[]O LA	Percent moisture (wet	moistu	ire (wet	Perc	Percent Solids	lids
	Dagunaki	Date	ug/kg	0	POL	ug/kg	0	POL	3%	0	POL	25	6	POT
Location 10	JININO	1/9/2012	3340	n	3340	4930	-	10000	2.05	1	010	040	1	1
Duplicate of JININ0	ININI	1/9/2012	3350	ח	3350	4370	-	10100	2.52		0.10	5 20		3 2
Location I	INIMI	1/9/2012	13000	n	13000	106000	-	39100	2.29		0.10	7.79		ē
Location 2	JINIM2	1/9/2012	3320	5	3320	13200	-	0266	2.70		0.10	67.3	İ	12
Location 3	JINIM3	1/9/2012	3330	D	3330	5710	-	0666	1.70		0.10	083		5
Location 4	JINIM4	1/9/2012	3250	n	3250	9740	3	9740	2.28		0.10	7.70	İ	=
Location 5	JINIMS	1/9/2012	3310	n	3310	9930	3	9930	2.08		0.10	67.6	I	-
Location 6	JINIM6	1/9/2012	3310	Ω	3310	61500	-	9930	1.79		0.10	98.2		0
Location 7	JINIM7	1/9/2012	3370	ם	3370	23800	-	10100	1.90		0.10	98.1	İ	0
Location 8	JINIM8	1/9/2012	3360	U	3360	4740	-	10100	2.19		0.10	87.6		0
Location 9	JINIMO	1/9/2012	3310	n	3310	51900	-	9930	2.12		0.10	979	İ	
Location 11	ININA	1/10/2012	0299	n	0299	25200	-	20000	0.10		010	96.4	-	-
Location 12	JININS	1/10/2012	3420	מ	3420	34800	-	10200	3.56		010	96.4	İ	į
Location 13	JINING	1/10/2012	3480	n	3480	10500	3	10500	3.61		0.10	94.8	-	2
Location 14	NINI	1/10/2012	3400	ם	3400	9460	ı	10200	5.21		010	957		0
Location 15".	JININ8	1/10/2012	27400	1137	27 100	130000	1	00E28	4.78		010	650	+	5
Resample of JININ8	J1R866	1/3/2013	180	7	3610	10800	2	10800	10 5. 47	7.83				3.
Comp-1	J1R867	1/3/2013	3450	5	3450	00909		10300	1.5	1				1
Comp-2	JIR868	1/3/2013	3510	ם	3510	9540	-	10500			27			1
Trip Blank 1	JINIMO	1/9/2012		1	100		3	The San	0.10		0.0	201		0
Trip Blank 2	JININ2	1/10/2012	あれる			では		かりを	0.10		0.10	8	+	5
Eoupment Blank	ZZZZ	1/100011	A	12.2		A COLUMN			1				-	-

B-16

Sample Location	HEIS Number	Sample Date		romic		C	bloric	le	F	luoric	le	N	itrate		1	Nitrite		Nitrogen	in Ni Vitrate	
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	POL	mg/kg	0	POL	mg/kg	0	POL
Location 10	JININO	1/9/2012	4.7	U	4.7	2.0	В	4.7	4.7	U	4.7	8.5	1	4.7	4.7	UR	4.7	2.23		0.47
Duplicate of J1N1N0	JININI	1/9/2012	4.7	U	4.7	2.0	В	4.7	4.7	U	4.7	8.7	1	4.7	4.7	UR	4.7	2.11		0.47
Location 1	JINIMI	1/9/2012	5.1	U	5.1	3.1	В	5.1	5.1	U	5.1	72.1	i	5.1	5.1	UR	5.1	16.3	D	
Location 2	JIN1M2	1/9/2012	5.0	U	5.0	4.2	В	5.0	1.1	B	5.0	29.6	1	5.0	5.0	UR	5.0		D	1.02
Location 3	JINIM3	1/9/2012	5.1	U	5.1	3.6	В	5.1	5.1	II	5.1	10.3	1	5.1	5.1	UR		6.75		0.50
Location 4	JINIM4	1/9/2012	4.6	U	4.6	1.5	В	4.6	4.6	II	4.6	2.7	BJ	4.6	4.6		5.1	2.34		0.51
Location 5	JINIM5	1/9/2012	5.0	U	5.0	1.1	В	5.0	5.0	U	5.0	2.1	BJ	5.0	5.0	UR	4.6	0.75		0.46
Location 6	JINIM6	1/9/2012	5.1	U	5.1	1.5	В	5.1	5.1	U	5.1	4.5	BJ			UR	5.0	0.53		0.50
Location 7	JINIM7	1/9/2012	4.6	Ū	4.6	5.5		4.6	4.6	II	4.6	16.0	BJ	5.1	5.1	UR	5.1	1.18		0.51
Location 8	JINIM8	1/9/2012	4.8	U	4.8	1.3	В	4.8	4.8				1	4.6	4.6	UR	4.6	3.62		0.46
Location 9	J1N1M9	1/9/2012	4.6	Ü	4.6	10.9	В			U	4.8	3.3	BJ	4.8	4.8	UR	4.8	0.83		0.48
Location 11	JININ4	1/10/2012	5.1			-		4.6	4.6	U	4.6	11.1	J	4.6	4.6	UR	4.6	2.57		0.46
Location 12				U	5.1	1.3	В	5.1	5.1	U	5.1	6.7	J	5.1	5.1	UR	5.1	1.59		0.51
	JININ5	1/10/2012	5.1	U	5.1	4.3	В	5.1	5.l	U	5.1	21.1	J	5.1	1.5	BJ	5.1	5.06		0.51
Location 13	JININ6	1/10/2012	5.2	U	5.2	1.3	В	5.2	5.2	U	5.2	3.6	BJ	5.2	5.2	UR	5.2	0.80		0.52
Location 14	JININ7	1/10/2012	2.2	В	4.9	312	D	24.5	4.9	U	4.9	39.4	1	4.9	4.9	UR	4.9	8.18		0.49
Location 15	JININ8	1/10/2012	4.9	U	4.9	3.2	В	4.9	4.9	U	4.9	4.9	UR	4.9	4.9	UR	4.9	0.49		0.49

Sample Location	HEIS	Sample	Pl	ıospha	te		Sulfate	
COMMUNICACIONAL CONTRACTOR CONTRA	Number	Date	mg/kg	Q	PQL	mg/kg	0	POL
Location 10	JININO	1/9/2012	9,3	UR	9.3	9.8	Û	4.7
Duplicate of JININO	JININI	1/9/2012	2.2	BJ	9.4	9.8	U	4.7
Location 1	JINIMI	1/9/2012	2.4	BJ	10.2	47.0		5.1
Location 2	JINIM2	1/9/2012	2.2	BJ	10.0	44.8		5.0
Location 3	JIN1M3	1/9/2012	10.1	UR	10.1	12.5	U	5.1
Location 4	JINIM4	1/9/2012	9.2	UR	9.2	5.8	U	4.6
Location 5	JINIM5	1/9/2012	9.9	UR	9.9	4.6	BU	5.0
Location 6	JINIM6	1/9/2012	10.1	UR	10.1	14.1	U	5.1
Location 7	JINIM7	1/9/2012	9.2	UR	9.2	62.0	-	4.6
Location 8	JINIM8	1/9/2012	9.7	UR	9.7	14.4	U	4.8
Location 9	JIN1M9	1/9/2012	9.2	UR	9.2	135	D	9.2
Location 11	JININ4	1/10/2012	3.2	BJ	10.2	24.7		5.1
Location 12	JININ5	1/10/2012	2.2	BI	10.3	105	D	10.3
Location 13	JININ6	1/10/2012	3.9	BJ	10.5	3.0	BU	5.2
Location 14	JIN1N7	1/10/2012	9.8	UR	9.8	246	D	24.5
Location 15	JIN1N8	1/10/2012	9.8	UR	9.8	41.6		4.9

Attachment	ı
Originator	N. K. Schiffern
Checked	I. B. Berezovskiy
Calc. No.	0300X-CA-V0167

Sheet No.	6 of 16
Date	12/18/12
Date	12/18/12
Rev. No.	0

•	Xylenes (total)	Vinyl chloride	irichiomethene	trans-1,3-Dichloropropene	trans-1,2-Dichloroethylene	Toluene	Tetrachloroethene	Styrene	Methylenechloride	Ethylbenzene	Dibromochloromethane	cis-1.3-Dichloropropene	cis-1,2-Dichloroethylene	Chloromethane	Chloroform	Chloroethane	Chlorobenzene	Carbon tetrachloride	Carbon disulfide	Bromomethane	Bromoform	Bromodichloromethane	Benzene	Acetone	4-Marhyl-2-Pentanone	2-Havanone	1.2-Dichloropropane	1.2-Dichloroethene(Total)	1,2-Dichloroethane	i.1-Dichloroethene	1.1-Dichloroethane	1.1.2.2- retractuoroetnane	1.1.1-1 richloroethane	Aroclor-1268	Aroclor-1262	Arocior-1260	Aroclor-1254	Arreior-1248	Aroclor-1232	Aroclor-1221	Aroclor-1016	Pyrene	Phenanthrene	Naphthalene	Indeno(123-cd)purene	Fluorantene	Dibenz[a,h]anthracene	Chrysene	Benzo(k)fluoranthene	Benzo(ghi)perylene	Benzo(b)fluoranthene	Benzo(a)aninracene	Anthracene	Acenaphthylene	Acenaphthene		Contraction	Constituents
	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOV	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	NO.	VOA	VOA	VOV	VOA	VOA	VOA	VOA	PCB	РСВ	PCB	PCB	200	PG	PCB	PCB	HAA	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH		CHANGE	Class Location 10 Duplicate of JININO Location 1
	4.97	9.93	4.97	4.97	4.97	4.97	4.97	4.97	5.96	4.97	4.97	4.97	4.97	9.93	4.97	9.93	4.97	4.97	4.97	9.93	497	\$	493		11.9	11.9	4.97	4.97	5.96	4.97	4.97	4.9/	4.97	13.4	13.4	25.7	121	13.4	13.4	13.4	13.4	1.48	1.20	3.68	370	39.0	3.39	1.14	3.39	3.39	1,00	1 3,39	3.39	3.39	6.11	ug/kg		
	<u>_</u>	c	c	U	U	U	U	c	U	U	C	c	U	c	· c	U	u	U	U	2	=	= 0	= 0				c	U	U		-		c	С	c	1	1	-	<u>_</u>	c	c	-	_	- 0	= 5	+	c	_	c	c .	1	- 0	2	5	-	0	1/9/2012	CONTRACTOR
	4.97	9.93	4,97	4.97	4.97	4.97	4.97	4.97	5.96	4.97	4.97	4.97	4.97	9.93	4.97	9.93	4.97	4,97	4.97	9.93	407	506	407	11.9	9	11.9	4.97	4.97	5.96	4 97	4.97	4.97	4.97	13.4	13.4	13.4	11.1	13.4	13.4	13.4	13.4	3.39	3.39	3 70	3.39	3.39	3.39	3.39	3.39	3.39	3,39	3.39	3.39	3.39	$\vdash$	PQL	2	A
Alta	5.05	10.1	5.05	5.05	5.05	5.05	5.05	5,05	6.06	5.05	5.05	5.05	5.05	10.1	5.05	10.1	5.05	5.05	5.05	10.1	505	400	12.1	12.1	12.1	12.1	5.05	5.05	6.06	505	3.00	5.05	5.05	13.4	13.4	28.1	30.5	13.4	13.4	13.4	13.4	125	115	317	3.28	3.71	3.28	0.903	3.28	3.28	378	3.14	3.28	3.28	22.4	ug/kgr		Duna
Attachment Originator	U	u	9	U	G	G	U	9	d	U	U	U	U	U	U	C	C	c	-	٥,	= 0	- 0				c	c	c	c (	= 0	2 0		c	c	c	1	1	d	c	U	c	۷.	_,	- 0	: 5	1	c	-	C	= 0	-		2	Ξ			1/9/20	CALEON
2	5.05	10.1	5.05	5.05	5.05	5.05	5.05	5.05	6.06	5.05	5.05	5.05	5.05	10.1	5.05	10.1	5.05	5.05	5.05	10.1	25	2.5	17.1	12.1	12.1	12.1	5.05	5.05	6.06	505	2.5	5.05	5.05	13.4	13.4	13.4	13,4	13.4	13.4	13.4	13.4	3.28	178	3.20	3.28	3.28	3.28	3.28	3.28	3 78	3.28	3.28	3.28	3.28	3.28	PQL	1/9/2012	ONTINE
N. K. Schiffem	4.69	9.39	4.69	4.69	4.69	4.69	4.69	4 69	5.63	4.69	4.69	4.69	4.69	9.39	4.69	9.39	4.69	4.69	4 69	9.39	4 60	40.9	E	11.3	13	11.3	4.69	4.69	5.63	4.09	4.09	4.69	4.69	13.6	13.6	29.8	12.0	3.6	13.6	13.6	13.6	1.87	8 2	3.34	114	7.07	3.34	3.34	3.14	374	3.34	334	3.34	3.34	44.0	mg/kg		-
	U	c	U	<b>c</b>	c	c	c	=	c	-	c	c	U	c	-	c	c	-	=	= 0	= 0	: 0	:   c		0	U	c	_	= 0	= 0	:	-	U	c	-		-	-	c	-	۵,	١.	- 5	-		1	c	-	- 0	= 0		-	2	9	_	0	1/9/2012	COCALIO
- 1	100	9.39	4.69	4.69	4.69	4.69	4.69	466	563	4.69	4.69	4.69	4.69	9.39	4.69	9.39	4.69	466	460	070	2.00	4.09	11.3	11.3	11.3	11.3	4.69	4.69	5.63	4.09	4.69	4.69	4.69	13.6	13.6	13.6	13.6	13.6	13.6	13.6	13.6	3.34	17.6	3.34	3.34	3,34	3.34	3.34	3.34	224	3.34	3.34	3.34	3.34	3.34	POL	2	T. Commercial
Sheet No.	3.94	7.88	3.94	3.94	3.94	394	302	102	477	392	3,94	3.94	3.94	7.88	3.94	7.88	3.94	101	200	7 88	1 2 2	3.94	9.46	9.46	9.46	9.46	3.94	3.94	473	3.94	3.94	3.94	3.94	13.3	13.3	9.17	3.44	13.3	13.3	13.3	13.3	3.42	3,30	2.23	3.42	3,42	3.42	3.42	3.42	3.42	1.66	1.34	3.42	3.42	3.42	no/ko	1	
11	c	2	C	-	=	=	= 0	= 0	= 6	= 0		=	-	-	=	-	= 0	= 0	= 0	: c	: 0	: c	G	c	c	c	۲	c (	= 0	:	c	c	G	-	= -	-	-	c	c	4	ح ا	= 0	-		9	U	U	c	=	: 0	-		S	5	5	0	1/9/2013	Other
8 of 16	3.94	7.88	3.94	3.94	302	202	304	30.5	477	201	3.94	394	3.94	7.88	3 94	7.89	200	302	104	1 90	4./3	3.94	9.46	9.46	9.46	9.46	3.94	3.94	471	3.9	3.94	3.94	3.94	13.3	4	13.5	1 3	13.3	13.3	13.3	13.3	3.42		3.42	3.42	3.42	3.42	3,42	347	3.42	3.42	3.42	3.42	3.42	3.43		3	. 7

	Pyrene	Phenanurene	Pentachlorophenoi	Nitrobenzene	Naphthalene	N-Nitrosodiphenylamine	N-Nitroso-di-n-dipropylamine	Isophorone	Indeno(1.2.3-cd)pyrene	Hexachiorographic	Hexachlorocyclopentadiene	Hexachlorobushiese	ritorene	Fluoranthene	Dimethyl phthalate	Diethyl phthalate	Dibenzofuran	Dibenz[a,h]anthracene	Di-n-octylphthalate	Di-n-burdphthalate	Chrysene	Carhazole	Butylhenzylphihalate	Bis/2 who heard) shiftship	Bis(2-Chloroethoxy)methane	Bis(2-chloro-1-methylethyl)ether	Benzo(k)fluoranthene	Benzo(ghi)perylene	Benzo(s)pyrene	Benzo(a)anthracene	Anthracene	Acenaphthylene	Accommodence	4-Nitroaniline	4-Chlorophenylphenyl ether	4-Chloroaniline	4-Chloro-3-methylphenol	4-Bromonhenvichenvi eiher	3-Nitroaniline	3.3'-Dichlorobenzidine	3+4 Methylphenol (cresol, m+p)	2-Nitrophenol	2-Niemyjpnenoi (cresol, o-)	2-Methylnaphthalene	2-Chlorophenol	2-Chloronaphthalene	2.6-Dinitrotoluene	2,4-Dinitrophenol	2.4-Dimethylphenol	2.4-Dichlorophenol	2.4.6-Trichlomohenol	1.4-Dichlorobenzene	1.3-Dichlorobenzene	1.2-Dichlorobenzene	2 4-Trichlomhenzene		Constituents
	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SOLVE	SON	SOAS NOAS	SVUA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	ACAS	AUVE	SVOA	SVOA	SVOA	SVOA	SVOA	NOAS	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	AOAS	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	NOA	SVOA	SVOA	NOVS	6004		2
	322	322	1610	322	322	322	322	202	220	220	220	226	322	322	322	322	322	322	322	275	220	226	226	322	322	322	322	322	322	322	322	322	1010	1610	322	322	322	322	1610	644	322	322	322	322	322	322	133	1610	322	322	322	322	322	322	angan		Location 3 Location 4
	c c		g	u	2	c: 0	= 0	= 0	= 0	= 5	= 0	=		c	c	U	G	2	0	= 0	= 0	: 0	c		: C	U	<b>C</b>	= 0	:	U	c	<b>=</b>	= 5	c	c	2	= 0	: 5	c	٤	c. (	= 0		U	c	= 0	-	: 5	c	-	: 0	c	c (	<b>-</b>	:0	1/9/2012	Location 3
	2 22	322	1610	322	322	323	3	3	322	77.	1 2	322	322	322	322	322	322	322	393	3 1	222	77.2	322	322	322	322	322	122	322	322	322	322	1610	1610	322	322	27.	322	1610	644	322	1010	322	322	322	220	322	1610	322	322	322	322	322	322	POL		
Attack Orig	325	325	1630	325	325	305	300	326	2000	322	100	323	325	325	325	325	325	325	3.01	300	300	300	323	325	325	325	325	70.5	325	325	325	305	1630	1630	325	325	305	325	1630	651	325	305	325	325	325	305	325	1630	325	325	325	325	325	325	ug/kg		L.
Attachment Originator Checked	-	c	S	c	= (	= 0	=	= 0	= 0	: 2	0	:   c	C	U	c	c	c		= -		: 0	-	: c		c	<	-	= c	c	c	=	= 0	: 5	<b>-</b>	U	Ξ ε	= 0	9	G	G	- 0	= 0	=	c	c (	= 0	:   =	LU	U	= =	:	u	-	= 0	0	1/9/2012	ocation 4
I. N.	325	325	1630	325	325	300	320	37.6	3 6	ž č	200	325	325	325	325	325	325	325	305	200	300	320	325	325	325	325	325	375	325	325	325	305	1630	1630	325	325	325	325	1630	651	325	1020	325	325	325	205	325	1630	325	325	325	325	325	325	POL		4
N. K. Schiffem	330	330	1650	330	330	330	000	330	000	330	330	330	330	330	330	330	330	OFF	OCC	300	000	330	330	330	330	330	330	330	330	330	330	130	1650	1650	330	OCC	OFF	330	1650	659	330	1000	330	330	330	330	330	1650	330	330	330	330	330	110	ug/kg		Location 5
<b>*</b>  -	=	U	IJ	c		: 0				: 5	-	c	u	u	c	c	-	= 0	= 0	2	-		c	c	U	U		: 0	c	U	c 0	= 0	2	U	c s	= 5	2	5	c	S	c c	=	c	c	c (	: c	- c	5	٥,	= -	: =	-	= 0	=	0	1/9/2012	Location
- NA.	330	330	1650	330	330	330	330	000	330	330	330	330	330	330	330	330	330	מני	370	330	330	330	330	330	330	330	OEF	330	330	330	330	330	1650	1650	330	110	330	330	1650	659	330	1650	330	330	330	730	330	1650	330	130	330	330	110	330	PQL	2	נא י
Sheet No. Date	659	659	3300	659	650	600	659	909	659	659	659	659	659	659	659	659	659	660	650	039	659	659	659	659	659	659	650	659	659	659	650	659	3300	3300	659	609	659	659	3300	1320	650	3300	659	659	659	659	659	3300	659	600	659	659	600	659	gy/ga		
9 of 16 12/18/12 12/18/12	98	an	Igu	B	5 8	50	B	5	9	Zgu	G	B	an	GD	S	9	38		5	GD	B	g	GD	an	B	9	3 8	5	ď	8	98	5	UDJ	8	S		B	rgu	ФD	Ign	3 8	9	ΟD	B	56	5 6	S	G	9		UD	UD	3 6	+	Н	1/9/2012	Location (
872 6	659	659	3300	659	660	659	659	629	659	659	659	659	659	659	659	659	650	620	609	659	659	659	659	659	659	659	650	659	659	659	650	659	3300	3300	659	659	659	659	3300	1320	650	3300	659	659	650	659	659	3300	659	629	659	659	620	659	PQL	2	o5

9		JINIM3, JINIM4, JINIM5,	I poston 3		-		,			. 1			
Constituents	Class		1/9/2012			1/9/2012	2		1/9/2012	2		Location 6	٥
		ug/kg	0	POL	ug/kg	0	POL	ug/kg	0	POI.	110/60	c	DOL
Acenaphthene	PAH	5.98	-	3.35	28	-	3.35	321	=	200	5 30	_	1
Acenaphthylene	PAH	3.35	3	3.35	3.35	10	3.35	101	3 =	3.21	3.10	,	2 10
Anthracene	PAH	3.35	5	3.35	3.35	5	3.35	3.21	13	3.21	3 18	3 =	3.18
Benzo(a)anthracene	PAH	9060	-	3.35	3.35	ח	3.35	3.21	0	121	8 50	3	318
Benzo(a)pyrene	PAH	0.956	-	3.35	3.35	ם	3.35	321	5	3.21	20	-	1 18
Benzo(b)fluoranthene	PAH	3.35	ח	3.35	3.35	ח	3.35	3.21	5	3.21	3 18	. =	3 5
Benzo(ghi)perylene	PAH	3.35	ח	3.35	3.35	n	3.35	3.21	=	102	3 18	5	316
Benzo(k)fluoranthene	PAH	3.35	Ω	3.35	3.35	n	3.35	3.21	=	121	3 18	=	3 18
Chrysene	PAH	3.35	0	3.35	3.35	n	3.35	3.21	=	101	3.18	=	3 10
Dibenz[a,h]anthracene	PAH	3.35	7	3 35	3 3 5	=	3 35	3.31	, =	100	3 10	2	01.0
Fluoranthene	PAH	3.35	n	3.35	0.938	-	3.15	121	2	3.21	301	9	3.10
Fluorene	PAH	3.35	m	3.35	3.35	I	335	2 80	-	121	2 10	111	2 10
Indeno(1.2,3-cd)pyrene	PAH	101	-	3.35	3 38	=	3.35	3.31		3.01	0 0	3 :	01.0
Naphhalene	PAH	1.76	-	3 35	280	-	2.35	3.0	- 1	17.0	2.10	>	3.18
Phenanthrene	PAH	3.35		335	3 34	,=	3.15	3.21	. =	3.21	84.0	-	3.18
Pyrene	PAH	3.35	n	3.35	0.054	)-	3 36	101	>=	301	2.10	0 :	2.10
Aroctor-1016	PCB	13.5	n	13.5	13.4		114	13.4	=	13.4	3.10	2 :	3.10
Aroclor-1221	PCB	13.5	1	13.5	13.4	=	13.4	134	=	13.4	13.4	=	10.4
Aroclor-1232	PCB	13.5	ח	13.5	13.4	-	13.4	13.4	=	13.4	13.	0 =	13.4
Arocior-1242	PCB	13.5	ח	13.5	13.4	מ	13.4	13.4	=	13.4	13.4	)=	13.4
Aroclor-1248	PCB	13.5	n	13.5	13.4	n	13.4	13.4	1	13.4	7.05	-	13.4
Aroclor-1254	PCB	4.59	,	13.5	13.4	ם	13.4	13.4	0	13.4	26.9		13.4
Aroclor-1260	PCB	13.5	n	13.5	13.4	n	13.4	13.4	7	13.4	2,66	-	13.4
Aroclor-1262	PCB	13.5	n	13.5	13.4	n	13.4	13.4	n	13.4	134	. =	13.4
Aroclor-1268	PCB	13.5	Ω	13.5	13.4	n	13.4	13.4	n	13.4	13.4	0 0	13.4
1.1.1-Trichloroethane	VOA	4.97	ח	4.97	5.05	n	5.05	5.10	n	5.10	8.4	0	4 96
1.1.2,2-Tetrachloroethane	VOA	4.97	n	4.97	5.05	n	5.05	5.10	2	5.10	8.5	5	4.96
1,1,2-Trichloroethane	VOA	4.97	ח	4.97	5.05	0	5.05	5.10	ח	5.10	8.4	ם	4.96
I.I-Dichloroethane	VOA	4.97	n	4.97	5.05	n	5.05	5.10	ລ	5.10	4.96	5	4.96
1.1-Dichloroethene	VOA	4.97	ם	4.97	5.05	n	5.05	5.10	ם	5.10	4.96	n	4.96
1.2-Dichloroethane	VOA	5.96	n	5.96	90.9	ם	90.9	6.11	n	6.11	5.95	n	5.95
1.2-Dictionerner Lotary	VOA.	4.97	0	4.97	5.05	D	5.05	5.10	ם	5.10	4.96	Ŋ	4.96
1,2-Dichloropropane	VO.	4.97	5	4.97	5.05	0	5.05	5.10	ם	5.10	4.96	n	4.96
2 Heyerone	400	5	0 :	2	17.1	0:	12.1	12.2	n	12.2	11.9	ם	11.9
4. Methyl-2. Pantanone	VOA	11.0	5	6.1.	177	0	12.1	12.2	5	12.2	6.11	n	6.11
Acrine	VOA	110	=	611	17.1	> =	1.7	12.2	<b>&gt;</b> :	12.2	6:11		11.9
Benzene	VOA	4.07	=	4 07	5.05	0 5	17.1	777	)	12.2	6.11	5	6.11
Bromodichloromerhane	VOA	8	=	20 2	20.0	2	20.0	2:5	0	0.10	8.3	5	4.96
Вготобогт	VOA	4.97	=	4 07	200	=	300	100	9	21.0	3.5	):	2.95
Bromomethane	VOA	9.93	2	9.93	10.1	2	101	102	0 =	102	8 8	5 =	5 5
Carbon disulfide	VOA	4.97	ח	4.97	5.05	5	5.05	\$ 10		\$ 10	406	=	4 06
Carbon tetrachloride	VOA	4.97	n	4.97	5.05	ח	5.05	5.10	ח	5.10	4.96	2	4.96
Chlorobenzene	VOA	4.97	ŋ	4.97	5.05	U	5.05	5.10	ח	5.10	8.4	2	4.96
Chloroethane	VOA	9.93	D	9.93	10.1	ם	10.1	10.2	מ	10.2	9.92	ח	9.92
Chlorocom	VOA.	4.97	5:	4.97	5.05	5	5.05	5.10	כ	5.10	4.96	n	4.96
cis. 1 2.Dichloroethulene	400	25.	> =	2.93	10.	5	10.1	10.2	5	10.2	9.92	D	9.92
cis-1.3-Dichloromopene	VOA	4 07	5	4.97	20.0	0 :	200	2.10	):	5.10	8.3	5	4.96
Dibromochloromethane	VOA	4.97	1=	4 97	200	=	20.0	2.10	0 :	5.10	96.7	0:	4.96
Ethylbenzene	VOA	4.07	=	4 07	505	=	30 8	27.0	0 =	0.10	0.50		4.90
Methylenechloride	VOA	5.96	5	2 36	909		909	611	=	2 -	5 05 A	0 =	200
Slyrene	VOA	4.97	5	4.97	5.05	n	5.05	5.10	=	\$ 10	8	=	4 96
Tetrachloroethene	VOA	4.97	ם	4.97	5.05	5	5.05	5.10	ח	5.10	4.96	n	4.96
Toluene	VOA	4.97	n	4.97	5.05	n	5.05	5.10	n	5.10	4.96	n	4.96
trans-1.2-Dichloroethylene	VOA	4.97	5	4.97	5.05	Ü	5.05	5.10	n	5.10	4.96	n	4.96
trans-1.3-Dichloropropene	VOA	4.97	5	4.97	5.05	ם	5.05	5.10	ח	5.10	4.96	n	4.96
Visid obleside	YOY YOU	4.97	5	4.97	5.05	5	5.05	5.10	ם	5.10	4.96	n	4.96
Yulanes (total)	100	3.35	2	,									
	7	1 02	=	3	10.1	1	10.1	10.2	5	10.2	26.6	5	9.92

	Pyrene	Phenol	Pharaphhane	Nitrodefizene	Maprimalene	N-Nitrosodiphenylamine	N-Nitroso-di-n-dipropylamine	Isophorone	Indeno(1,2,3-cd)pyrene	Hexachloroethane	riexaciiiorocyciopeniadiene	nexacilloroduaglene	ricxachiorogenzene	Usershipship	Fluorena	Fluoranthene	Dimethyl phybalate	Diethyl phthalate	Dibenzohiran	Dihenzia hianthracene	Dispostylphybalara	Di a-butulabihalasa	Chocene	Dulyibenzyiphulalate	But of home de historie	Big 2-shulbered phihalate	Bis(2-chlomethyl) other	Ris(2-Chlomethory)methans	Bir/2-chloro   metholasholisho	Benzo/k\Supperyielle	Benzo(b)fluoranthene	Benzo(a)pyrene	Benzo(a)anthracene	Anthracene	Acenaphthylene	Acenaphthene	4-Nironhenol	4-Ciliorophenylphenyl einer	4-Chioroaniline	4-Chloro-3-methylphenol	4-Bromophenylphenyl ether	4.6-Dinitro-2-methylphenol	3-Nitroaniline	3.3'-Dichlorobenzidine	3+4 Methylphenol (cresol, m+p)	2-Nirrophenal	3-Nitroaniline	2-Methylnaphthalene	2-Chlorophenol	2-Chloronaphthalene	2,6-Dinitrotoluene	2.4-Dinitrotoluene	2.4-Dinitrophenol	2.4-Dimethylphenol	2.4.0- a removement	2.4.5- Lrichtorophenol	1.4-Dichlorobenzene	1.3-Dichlorobenzene	1.2-Dichlorobenzene	1.2.4-Trichlorobenzene		Constituents	
	SVOA	SVOA	AOAS	VOAS	SVUA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	NOV	AOA	MOAS	S CON	SVOA	SVOA	SVO A	SVOA	SVOA	SVOA	NOVE	NOV	NOVE	2000	2000	SON	NOV.	NOVE	2000	SVOA	SVOA	SVOA	SVOA	NOAS	SVOA	AOAC	NOAS	SVOA	SVOA	SVOA	SVOA	NOAS	SVOA	NOAS	SVOA	AOAS	SVOA	SVOA	AOVS	AOAS	AOAS	NOAS	SVOA	AOAC	SVOA	SVOA	SVOA	SVOA	SVOA		Class	
	1980	1080	OKRA	0861	0861	1980	1980	1980	1980	1980	0861	ORGI	DRAI	1900	1000	1090	1000	1200	1080	000	1000	1980	0861	1980	1900	1900	1000	1990	1980	1980	1980	1980	1980	1980	1980	1980	0680	1980	1980	1980	1980	1980	9890	3950	1980	1080	1980	1980	1980	1980	1980	1980	9890	1980	0861	1980	1980	1980	1980	1980	By/dn		JINIMA, JINIMA, JINIMA
[6	58	5 6	5	GD	GD	G	B	CD	OB	UD	UDJ	5	GD.	E	5	3	36	5 6	3 6	3 8	3 8	16	96	9	9	5 6	5 6	3 8	5	9	GB	UD	UB	S	5			90	rgu	ē	GD	Lan	S	E E	8	5 8	9	8	UD	Ð	υD	Ð	E E	3 8	5 6	G	E G	G		G)		1/9/2012	MITTELL
1	080	1900	0686	1980	0861	1980	1980	1980	1980	1980	0861	1980	1980	0861	000	1000	1900	1900	1000	1900	0861	1980	0861	0861	1980	1980	1980	0861	0861	0861	1980	1980	1980	1980	1980	1080	0686	0861	1980	1980	1980	1980	9890	3950	1980	1080	1980	1980	1980	1980	1980	1980	9890	1080	1980	1980	1980	1980	1980	1980	TOA		3,3
	052	062	4770	953	953	953	953	953	953	953	953	953	953	953	900	0.63	900	200	933	900	953	953	953	953	CCA	903	50.6	955	953	953	953	953	953	953	953	27.4	4//0	953	953	953	953	953	4770	1910	953	0//4	953	953	953	953	953	953	4770	200	953	953	953	953	953	953	ug/kg		
Attachment	5 8	5 8	Lan	UB	UB	a	UB	GD	G	B	īgu	UD	Ġ	G	5	5 6	5	5	9 8	5	5	G	9	U	18	100	5	5	8	S	UD	UD	an	S	5	5 5	do	G	ran	ГĒ	an	ΡĒ	8	E C	5 8	18	18	8	UD	8	UD	8	5	3 8	8	UB	an	8	B	5		1/9/2012	JANA
2	053	903	4770	953	953	953	953	953	953	953	953	953	953	953	953	900	955	900	953	955	953	953	953	953	953	3	300	953	953	953	953	953	953	953	250	67/1	4770	953	953	953	953	953	4770	1910	953	4//0	953	953	953	953	953	953	4770	25,50	953	953	953	953	953	953		2 6	, 5
N. K. Schiffern	140	047	3230	647	647	647	647	647	647	647	647	647	647	647	04/	04/	047	94/	24/	047	647	647	647	647	047	047	047	647	647	647	647	647	647	647	647	3230	3230	647	647	647	647	647	3230	1305	2 2	3230	947	647	647	2	647	247	Orce.	2 2	647	647	647	647	947	247	nayea	1	
	5	5	rgu	dD	UD	UD	an	an	UD	αD	υĐ	GD	S	UB	GD.	5	G	5	5	UD	GD	GD	g	g	dD	QD	G	G	G	GD	ď	dD	αυ	8	3 8		S	G	ran	UDJ	Ş	UDJ	G G		3 8	GO C	OD	6	8	5	8	C S		38	GU	GD	G	5	1	Sk	02/201	COCHESON A	ZINIW.
	2	947	3230	647	647	647	647	647	647	647	647	647	647	647	947	24	947	947	947	647	547	647	947	647	647	647	647	647	647	647	647	647	947	247	1 2	3230	3230	647	647	647	647	647	3230	1300	247	3230	647	647	647	647	647	647	1000	3	647	647	647	647	647	\$4. \$4. \$4.	Pol	9	, ,2
Sheet No.	2040	2040	10200	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2046	2040	2040	2040	2040	2040	2010	10200	10200	2040	2040	2040	2040	2040	10200	4000	2040	10200	2040	2040	2040	2040	2040	2040	1000	2040	2040	2040	2040	2040	2040	2040	ma/ka	1	
12/12/12	9	G	ran	UD	G	dD	G	8	B	B	ran	αD	υD	g	an	G	GD	g	GD	dD	Ð	B	a	В	B	S	G	Ð	UD	UD	UD	B	Ð	9	3 8	Idn	GD.	an	rgu	ran	8	rg.	5	3 6	38	dD	an	S	B	u d	9	5	5 8	9	an	UD	8	8	1	_	07/01/1	T uouson	JININA,
2040 11 of 16 12/18/12	2040	2040	10200	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	2040	10200	10200	2040	2040	2040	2040	2040	1000	100	204	1020	2040	204	2040	2040	2040	2040	1040	204	2040	2040	204	2040	700	7040	200		

	Towns I	_	Achine.			o and lane	0	•					
Constituents	Class		1/9/2012			1/9/2012			1/9/2012	2	7	1/10/2012	_
		ug/kg	0	PQL	ng/kg	0	PQL	ug/kg	0	POL	ug/kg	0	POI
Acenaphthene	PAH	92.7		3.27	5.38	7	3.36	40.8	-	3.27	55.5	-	3.44
Acenaphthylene	PAH	3.27	U	3.27	3.36	5	3,36	3.27	3	3.27	3.4	T/A	3.44
Anthracene	PAH	3.27	n	3.27	3.36	n	3.36	3.27	5	3.27	4	m	4
Benzo(a)anthracene	PAH	8.41		3.27	3.36	n	3.36	2.29	-	3.27	2.81	-	344
Benzo(a)pyrene	PAH	10.7		3.27	1.23	-	3.36	5.73	L	3.27	60 6		3.44
Benzo(b)fluoranthene	PAH	13.0		3.27	3.36	n	3.36	4.26		3.27	3.44	5	3.44
Benzo(ghi)perylene	PAH	5.40		3.27	3.36	n	3.36	3.27	n	3.27	3.44	1	144
Benzo(k)fluoranthene	PAH	3.27		3.27	3.36	ם	3.36	18.6		3.27	4	=	14
Chrysene	PAH	14.9		3.27	3.36	U	3.36	85.0	L	3.27	3.44	=	144
Dibenz[a,h]anthracene	PAH	3.27	n	3.27	3.36	n	3.36	3.27	12	3.77	3.44	=	3 44
Fluoranthene	PAH	9.17		3.27	2.29	5	3.36	8 35		3.37	7.63	,	3.44
Fluorene	PAH	3.27	In	3.27	3.36	n	3.36	327	E	101	253	-	2 4
Indeno(1,2,3-cd)pyrene	PAH	4.06		3.27	90.	-	3.36	2.00	-	3.77	3 44		2 44
Naphthalene	PAH	8.07	7	3.27	2.19	-	3.36	108	-	3.27	4 08	-	3 44
Phenanthrene	PAH	2.14	-	3.27	0.875	-	3.36	305	-	337	203		3.44
Pyrene	PAH	9.03		3.27	1.18	-	3.36	4.75		101	3 44	. =	1 44
Aroclor-1016	PCB	13.3	5	13.3	13.3	n	13.3	5 65	GE C	\$ 65	13.4	2	13.5
Aroclor-1221	PCB	13.3	UJ	13.3	13.3	=	133	5 65	=	\$ 63	13.5	3 5	3 5
Aroclor-1232	828	13.3	3	13.3	13.3	ח	13.3	52.5	2	505	13.5	3 5	12.5
Aroclor-1242	PCB	13.3	3	13.3	13.3	1	133	\$ 65	9	3 63	13.5	3 =	136
Aroclor-1248	PCB	13.3	īn	13.3	13.3	=	13.3	5 65	3	> 63	13.5	3 5	200
Aroclor-1254	PCB	50.9	-	13.3	12.5	-	13.3	318	2	505	403	3	3 2
Aroclor-1260	PCB	21.4	-	13.3	13.3		13.3	690	0	363	17.5		13.5
Aroclor-1262	80g	13.3	5	13.3	13.3	2	13.3	\$ 25	1	505	13.5	. =	13.0
Aroclor-1268	PCB	13.3	3	13.3	13.3	ח	13.3	525	9	505	3.5	SE	13.6
1,1,1-Trichloroethane	VOA	4 36	n	4.36	5.21	n	5.21	4.71	2	4.71	5 30	3 =	2 30
1,1.2,2-Tetrachloroethane	VOA	4.36	n	4.36	5.21	ח	5.21	4.71	2	4.71	5 30		2 30
1.1.2-Trichloroethane	VOA	4.36	n	4.36	5.21	n	5.21	4.71	מ	4.71	5.30	1	5.30
1.1-Dichloroethane	VOA	4.36	n	4.36	5.21	D	5.21	4.71	n	4.71	5.30	n	5 30
1,1-Dichloroethene	VOA	4.36	n	4.36	5.21	n	5.21	4.71	ס	4.71	5.30	n	\$ 30
1,2-Dichloroethane	VOA	5.23	n	5.23	6.25	n	6.25	5.65	5	5.65	6.36		2,9
1.2-Dichloroethene(Total)	VOA	4.36	n	4.36	5.21	ם	5.21	4.71	ח	4.71	5 30	=	630
1.2-Dichloropropane	VOA	4.36	Ω	4.36	5.21	ח	5.21	4.71	5	4.71	5.30	=	5 30
2-Butanone	VOA	10.5	Ω	10.3	12.5	ם	12.5	11.3	n	113	127	=	19.7
2-Hexanone	VOA	10.5	n	10.5	12.5	n	12.5	11.3	ם	11.3	12.7	1	12.7
4-Methyl-2-Pentanone	VOA	10.5	n	10.5	12.5	n	12.5	11.3	ם	11.3	12.7	5	12.7
Acetone	VOA	10.5	5	10.5	12.5	n	12.5	11.3	Ŋ	11.3	12.7	ם	12.7
Benzene	VOA	4.36	b	4.36	5.21	D	5.21	4.71	Ω	4.71	5.30	ח	5.30
Bromodichloromethane	VOA	5.23	n	5.23	6.25	5	6.25	5.65	Ŋ	5.65	98.9	n	96.9
Bromororm	VOA	4.36	5	4.36	5.21	ם	5.21	4.71	ם	4.71	5.30	n	5.30
Dromoniemane October districts	VOV.	8.71	0:	8.71	10.4	5	10.4	9.42	D	9.42	9'01	n	9.01
Carbon disturide	VOA.	4.30	5:	4.36	5.21	5	5.21	4.71	5	4.71	5.30	ח	5.30
Chlombenzene	400	426	0 =	4.30	2.21	5	2.21	4.71	0	4.71	5.30	ח	5.30
Chloroethane	VOA	871	5=	0.75	10.4	3 =	17.0	4.7		4.71	3.30	5	2.30
Chloroform	VOA	4.36	)=	4 36	5.01	5 =	10.4	75.6	2	7.47	10.0	):	970
Chloromethane	VOA	8.71	=	871	10.4	5	10.4	4.7	7	4.0	05.5	> :	3
cis-1,2-Dichloroethylene	VOA	4.36	ח	4.36	5.21		105	471	=	74.7	\$ 30	5 =	20.0
cis-1.3-Dichloropropene	VOA	4.36	2	4.36	5.21	5	5.21	4.71	,=	4.71	5 30	=	200
Dibromochloromethane	VOA	4.36	ח	4.36	5.21	ח	5.21	4.71	5	4.71	200	=	3 3
Ethylbenzene	VOA	4.36	Ω	4.36	5.21	ם	5.21	4.71	ח	4.71	230	=	2 30
Methylenechloride	VOA	5.23	n	5.23	6.25	n	6.25	5.65	ח	5,65	6.36	ח	6.36
Styrene	VOA	4.36	n	4.36	5.21	5	5.21	4.71	Þ	4.71	5.30	n	5.30
Tetrachloroethene	VOA	4.36	5	4.36	5.21	n	5.21	4.71	ח	4.71	5.30	n	5.30
toluene	VOA.	4.36	0	4.36	5.21	D	5.21	4.71	n	4.71	5.30	n	5.30
trans-1.2-Dichloroemylene	VOA.	4.30	0 :	4.36	5.21	n	5.21	4.71	ם	4.71	5.30	ם	5.30
Trichlomethene	VOA	4.30	5	4.36	5.21	5	5.21	4.71	5	4.71	5.30	n	5.30
Vinvl chloride	VOV.	8.71	=	4.30	1770	1:	2.2	4.71		4.71	5.30		5.30
Vedanas Gastalli						-	_	070		070	200	:	1
AVICINES HOUSE)	VOA	4.36	=	4.36	5.01	<b>=</b>	10.4	9.42	5 5	9.42	97.5	בו	10.6

	Pyrene	Phanol	Pentachlorophenol	Nitrobenzene	Naphthalene	N-Nitrosodiphenylamine	N-Nitroso-di-n-dipropylamine	Isophorone	Indeno(1,2,3-cd)pyrene	Hexachloroethane	Hexachlorocyclopentadiene	Hexachlorobutadieno	Hexachlorobenzene	Fluorene	Fluoranthene	Dimethyl phthalate	Diethyl phthalate	Dibenzofuran	Dibenz[a,h]anthracene	Di-n-octviphthalate	Di-n-butylphthalate	Chrysene	Carbazole	Bulyibenzyiphthalate	Bis(2-ethylhexyl) phthalate	Bis(2-chloroethyl) ether	Bis(2-Chloroethoxy)methane	Bis(2-chloro-1-methylethyl)ether	Benzo(k)fluoranthene	Benzo(ghi)perylene	Benzo(b)fluoranthene	Benzo(a)pyrene	Benzo(a)anthracene	Anthracene	Acamahhhulana	4-Natrophenol	4-Nitroaniline	4-Chlorophenylphenyl ether	4-Chloroaniline	4-Chloro-3-methylphenol	4-Bromophenylphenyl ether	4.6-Dinitro-2-methylphenol	3-Nitroaniline	1 3'-Dichlorchenzidine	2-Nitrophenot	2-Nitroaniline	2-Methylphenol (cresol, o-)	2-Methylnaphthalene	2-Chlorophenol	2.6-Dinitrotottene	2.4-Dinitrotoluene	2.4-Dinitrophenol	2,4-Dimethylphenol	2.4-Dichlorophenol	2.4.6-Trichlorophenol	2.4.5-Trichlorophenol	1.3-Dichlorobenzene	1.2-Lichiorogenzene	1.2.4- Inchlorobenzene	134	Constituents	Constituents	
	SVOA	AOAS	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	AOAS	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	NOAS	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	SVOA	AOVO	SVOA	SVOA	SVOA	AOVS	SVOV	SVOA	SVOA	AOAS	SVOA	SVOA	SVOA	SVOA	AOVS	SVOA	SVOA	2	CHANGE	1	-
	1020	0201	5090	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1000	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	020	5090	5090	1020	1020	1020	1020	1020	5000	0201	1020	5090	1020	1020	020	1020	1020	5090	1020	1020	1020	1000	020	1020	1020	ug/kg		Location 12 Location 13	
	E S	5 6	rgu	B	UD	dD	GD	U	B	an	Eg	B	8	9	5	9	9	6	8	5	8	9	8	S	S	UD.	S	S	S	B	G	8	8	3 8	5	ig.	S	GD	ran	rgu	B	9	3 5		S	E G	B	5	5 8	5 8	GD	lan	UD	8	5 5	5 8	3 8	GD	G	0	1/10/201	ocation	TALL TO SERVICE
	1020	020	5090	1020	1020	1020	1020	1020	1020	1020	1020	1020	020	020	1020	1020	1020	1020	020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	5090	5090	1020	1020	1020	1020	1020	200	1020	1020	5090	1020	1020	1000	1020	1020	5090	1020	1020	1020	1020	1020	1020	1020	PQL	2	ដ	
o o o a	347	34/	1740	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	34/	1740	1740	347	347	347	347	347	740	347	347	1740	347	347	147	347	347	1740	347	347	347	147	347	347	347	ug/kg		1	- Carre
Attachment Originator Checked	c	: 0	2	c	С	U	c	u	U	-	2	c	u l	<	-	c	-	=	<b>u</b>	= 0	=	=	ح	-	ċ	Ċ	u	c	u	c	c	c	c	2 0	:	2	С	G	U	5	c	= 0	= 2		c	U	U	c	2 0	:   =	С	EJ	C	c (	= 0	=	: 0	c	c	0	L/10/20	ocation	
. P.Z	347	341	1740	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	347	147	347	347	347	347	347	347	347	347	347	347	347	347	147	347	1740	1740	347	347	347	347	147	CKO	347	347	1740	347	347	347	347	347	1740	347	347	347	247	347	347	347	PQL	12	Ę,	
l N. K. Schiffern I. B. Berezovskiy	339	339	1700	339	339	339	339	339	339	339	339	339	96.5	339	339	339	OFF	000	370	arr	370	330	965	339	339	339	339	339	339	339	339	330	370	110	239	1700	1700	339	339	339	339	330	1700	339	339	1700	339	339	339	339	339	1700	339	339	955	370	339	339	339	ug/kg		Location 14	100
n iy	U	c	UJ	U	_	c	c	c	c	=	5	-	=	-		= 0	= 0	= 0	= 0	=	= 0		= 0	-	_	c	c	c	<b>-</b>	c	c	=	= 0	:		2	U	U	2	2	4		: 5	c	c	c	<b>C</b>	= 0		; c;	u	IJ	<b>-</b>	c	= 0	:	-	c	U	0	1/10/20	ocation	
	339			339	339	339	339	339	339	339	339	339	orr	339	339	330	OFF	330	330	330	015	370	96.2	339	339	339	339	339	339	339	339	955	170	230	339	1700	1700	339	339	339	339	330	8/0	339	339	1700	339	339	900	339	339	1700	339	339	370	200	339	339	339	-PQL	12	14	
Sheet No. Date Date	2010	2010	10000	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	0100	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	0105	2010	10000	10000	2010	2010	2010	2010	2000	4020	2010	2010	10000	2010	2010	2010	2010	2010	10000	2010	2010	2010	2010	2010	2010	2010	ug/kg		-	
	88	1		B	ē	B	B	g	B	5	E 5	3	3	3	3	3 8	38	3 8	3 8	5	5 8	3 8	3 8	Ē	au	ğ	Σ	Ē	9	9	5	36	3 8	5	a	ran	an	ran	ē	ran	3	5 6	100	dD	UD	an.	8	3 8	5 6	A	- -	υĐ	8	ran		5			-	0	1/10/2012	ocation I	-
13 of 16 12/18/12	2010	2010	10000	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	0100	0100	2010	2010	2010	0100	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010	010	2010	10000	10000	2010	2010	2010	2010	2000	4020	2010	2010	10000	2010	2010	2010	2010	2010	10000	2010	2010	2010	2010	2010	2010	2010	TOA	2	5	

	Xylenes (total)	v inyi ciriotine	Vind chloride	Trichlomethere	trans-1.3-Dichlompropene	trans-1.2-Dichloroethylene	Toluene	Tetrachloroethene	Styrene	Menistenendo	Mathidamachlasid	Ethylhenzene	Dibromochloromethane	cis-1,3-Dichloropropene	cis-1.2-Dichloroethylene	Chloromethane	Chlorototii	Chloroform	Chlomethane	Chlorobenzene	Carbon tetrachloride	Carbon disulfide	Bromomethane	Bromoform	Bromodichloromethane	Benzene	Acelone	4-Michiyi-2-Pentanone	A Mathe 7 Pastone		2-Ritarone	2-Dichlompropage	1.2-Dichloroethene(Total)	1.2-Dichloroethane	Dichlomethene	1 Dichlomethan	1 1 2-Trichlomethane	1 1 2 2 Tele-til	Aroctor-1268	Aroclor-1262	Aroclor-1260	Aroclor-1254	Aroclor-1248	Arocior-1242	Aroclor-1232	Aroclor-1221	Aroclor-1016	Pyrene	Phenanthrene	Naphthalene	Indeno(1.2.3-cd)pyrene	Flinorene	Phoraphene	Chrysene	Benzo(k)Huoranthene	Benzo(ghi)perylene	Benzo(b)Illuoranthene	Benzo(a)pyrene	Benzo(a)anthracene	Anthracene	Acenaphthylene	Acenaphthene		Constituents	
	I VOA	YON	100	VOA	VOA	VOA	VOA	VOA	VOA	VOA		VO.	VOA	VOA	VOA	VOA	NO.		VOA.	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	VOA	100		100	VOA	VOA	VOA	VOA	VOX.	VOA.	VOA	PCB	РСВ	PCB	РСВ	PCB	PCB	PCB	PCB	PCB	PAH	PAH	PAH	PAH	DAG	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH	PAH		Class	
	5.41	10.0	5.44	441	54	54	5.41	5.41	5.41	0.00	14.0	S d l	5.41	5.41	5.41	10.8	3.41	10.0	200	54	541	5.41	10.8	5.41	6.50	5.41	13.0	13.0	10.0	13.0	130	54	541	650	5.41	2.41	5.41	3.41	13.5	13.5	28.2	106	12.5	13.5	13.5	13.5	13.5	5.52	7.19	3.72	3.63	103	0.00	3.30	1.97	3.30	3.30	8.28	4.76	3.30	7.19	74.3	ma/ka	]_	JININS, JINING, JININT,
	c	c	: 0	= 0	= 0	=	=	U	u	c	: 0	= 0	=	<b>-</b>	U	c	c		-	=	=	-	c	c	C	c	c	c	: 0		= 0		= 0	= 0	=		: 0	: 0	0	C				c	C	G	c			7	+	+	0	: 0	5	c	c			٤	_	-	O	LOCATION 12	MINIC
	5.41	10.8	14.5		541	17.5	5.4	5.41	5.41	6.5	5.4	1	54	5.41	5.41	10.8	3.41	10.0	100	5	54	5.41	10.8	5.41	6.50	5.41	13.0	13.0	0.01	13,0	14.0	0.41	441	5.41	0.4	5.41	5.41	5.41	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	3.30	3.30	3.30	3000	3 30	3 20	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	-+	POI	12	; ,
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# APPENDIX C DATA QUALITY ASSESSMENT

# APPENDIX C

# DATA QUALITY ASSESSMENT

# CONFIRMATORY AND VERIFICATION SAMPLING

A data quality assessment (DQA) was performed to compare the confirmatory sampling approach and resulting analytical data with the sampling and data requirements specified in the site-specific sample design (WCH 2008). Confirmatory sampling showed the 300-32 waste site to be nearly clean. Additional remediation was needed after which three additional (verification) samples were collected per an agreement with the U.S. Environmental Protection Agency (EPA) (WCH 2013). This DQA was performed in accordance with site specific data quality objectives found in the 300 Area Remedial Action Sampling and Analysis Plan (SAP) (DOE-RL 2011).

A review of the sample designs (WCH 2008, 2013), the field logbook (WCH 2013), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample designs. To ensure quality data, the SAP data assurance requirements and the data validation procedures for chemical analysis (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Confirmatory sample data collected at the 300-32 waste site were provided by the laboratories in two sample delivery groups (SDG) K3796 and KP0175. SDG K3796 was submitted for third-party validation. Major deficiencies were identified in the analytical data set as follows below.

# **MAJOR DEFICIENCIES**

In the method 300.0 anions analysis, holding times for nitrate, nitrite, and orthophosphate were exceeded for all of the SDGs. Third-party validation qualified the nondetected results for these analytes in SDG K3796 as rejected with "UR" flags. The project has qualified the nondetected results for these analytes in SDG KP0175 as rejected. The short holding time in the Method 300.0 analysis was recognized and Method 353.2 was also requested to obtain usable data for nitrate and nitrite. The Method 353.2 data effectively replaces the rejected nitrate and nitrite data. Orthophosphate is not a regulated compound. The resulting data set is sufficient and usable for decision-making purposes.

# MINOR DEFICIENCIES

Minor deficiencies are discussed for the 300-32 data set, as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

# **SDG K3796**

This SDG comprises 19 total samples, of which 16 are field samples (J1N1M1 through J1N1M9, J1N1N0, J1N1N1, J1N1N4 through J1N1N8), 2 are trip blanks (J1N1M0, J1N1N2), and 1 is an equipment blank (J1N1N3). A primary and duplicate soil sample pair (J1N1N0/J1N1N1) are included in the field samples. The trip blanks were analyzed for volatile organic compounds (VOCs). The equipment blank was analyzed for inductively coupled plasma (ICP) metals, semivolatile organic compounds (SVOCs), and mercury. The field samples were analyzed for IC anions, nitrate, nitrite, total petroleum hydrocarbons (TPH), ICP metals, hexavalent chromium, mercury, polychlorinated biphenyls (PCBs), SVOCs, polycyclic aromatic hydrocarbons (PAH), VOCs, gross alpha, gross beta, isotopic uranium, total uranium, and by gamma energy analysis (GEA). SDG K3796 was submitted for third-party validation. Minor deficiencies are as follows:

In the SVOC analysis, the laboratory control sample (LCS) recoveries for hexachlorocyclopentadiene (44%) and pentachlorophenol (34%) are outside the quality control (QC) limits. Third-party validation qualified all results for these two analytes in SDG K3796 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the SVOC analysis, matrix spike (MS) recoveries for 2,4-dinitrophenol (0%), 3,3,-dichlorobenzidine (0%), 4,6-dinitro-2-methylphenol (44%), 4-chloro-3-methylphenol (0%), 4-chloroanaline (39%), 4-nitrophenol (0%), hexachlorcyclopentadiene (0%), and pentachlorophenol (0%) are outside the QC limits. Third-party validation qualified all of the associated results as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the SVOC analysis, matrix spike duplicate (MSD) recoveries for 2,4-dinitrophenol (0%), 4,6-dinitro-2-methylphenol (35%), hexachlorcyclopentadiene (0%), and pentachlorophenol (0%) are outside the QC limits. Third-party validation qualified all of the associated results as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the SVOC analysis, a surrogate recovery for sample J1N1N8 is outside the QC limits. Third-party validation qualified the associated analytes (2,4-dichylorophenol, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, pentachlorophenol, bis(2-chloroethyl)ether, bis(2-chloroisopropyl)ether, bis(2-chloroethoxy)methane, 4-chlorophenyl phenyl ether, and 4-bromophenyl phenyl ether) as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the SVOC analysis, the relative percent difference (RPD) calculated for 4-chloroanaline (40%) is above the QC limit. Third-party validation qualified all 4-chloroanaline results in

SDG K3796 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the total petroleum hydrocarbons (TPH) analysis, no MS, MSD or LCS analysis was performed for the motor oil (MO) fraction. Third-party validation qualified all of the TPH-MO results as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the inductively coupled plasma (ICP) metals analysis, the MS recovery for antimony (45.5%) is outside the QC limits. Third-party validation qualified all associated antimony data as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the polychlorinated biphenyl (PCB) analysis, surrogate recoveries in samples J1N1M7 and J1N1N4 are outside QC limits. Third-party validation qualified all PCB results for samples J1N1M7 and J1N1N4 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the polycyclic aromatic hydrocarbons (PAH) analysis, MS recoveries for naphthalene (29%), acenaphthylene (36%), acenaphthene (20%), and the MSD for naphthalene (39%) are outside QC limits. Third-party validation qualified all data for these analytes in SDG K3796 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the PAH analysis, a surrogate recovery in sample J1N1N7 is outside QC limits. Third-party validation qualified all PAH results for sample J1N1N7 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the PAH analysis, RPDs calculated for acenaphthylene (68%), acenaphthene (110%), fluroene (56%), and anthracene are outside QC limits. Third-party validation qualified all results for these analytes in SDG K3796 as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the method 300.0 anions analysis, holding times were exceeded by more than twice the limit for nitrate, nitrite, and orthophosphate. Non detected results for these analytes are discussed above in the Major Deficiencies section. Detected results for nitrate, nitrite, and orthophosphate were qualified by third-party validation as estimated with "J" flags. Estimated data are usable for decision-making purposes.

In the method 300.0 anions analysis, sulfate was detected in the method blank (MB). Sulfate results in samples J1N1M3, J1N1M4, J1N1M5, J1N1M6, J1N1M8, J1N1N0, J1N1N1, and J1N1N6 were qualified by third-party validation as estimated with "J" flags. Estimated data are usable for decision-making purposes.

# **SDG KP0175**

This SDG comprises three composite field samples (J1R866 through J1R868) analyzed for TPH. Minor deficiencies are as follows:

In the TPH analysis, no MS, MSD or LCS analysis was performed for the MO fraction. Results for TpH-MO may be considered. Estimated data are usable for decision-making purposes.

# FIELD QUALITY ASSURANCE/QUALITY CONTROL

Relative percent difference evaluations of main sample(s) versus the laboratory duplicate(s) are routinely performed and reported by the laboratory. Any deficiencies in those calculations are reported by SDG in the previous sections.

Field quality assurance (QA)/QC measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2012), are the primary and duplicate samples (J1N1N0/J1N1N1). The main and QA/QC sample results are presented in Appendix B.

Field duplicate samples are collected to provide a relative measure of the degree of local heterogeneity in the sampling medium, unlike laboratory duplicates that are used to evaluate precision in the analytical process. The field duplicates are evaluated by computing the RPD of the sample/duplicate pair(s) for each contaminant of potential concern (COPC). Relative percent differences are not calculated for analytes that are not detected in both the main and duplicate sample at more than five times the target detection limit. Relative percent differences of analytes detected at low concentrations (less than five times the detection limit) are not considered to be indicative of the analytical system performance. The calculation brief in Appendix B provides details on duplicate pair evaluation and RPD calculation.

The RPD calculated for uranium (51.6%) is above the acceptance criteria of 30%. Elevated RPDs in environmental samples are generally attributed to natural heterogeneities in the sample matrix. The data are usable for decision-making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) is less than five times the target detection limit (TDL), including undetected analytes. In these cases, a control limit of  $\pm 2$  times the TDL is used (Appendix B) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable for decision-making purposes.

# Summary

Limited, random, or sample matrix-specific influenced batch QC issues such as those discussed above, are a potential for any analysis. The number and types seen in the data set are within expectations for the matrix types and analyses performed. The DQA review of the 300-32 waste

site confirmatory sampling data found that the analytical results are accurate within the standard errors associated with the analytical methods, sampling, and sample handling. The DQA review for 300-32 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. The analytical data were found acceptable for decision-making purposes. The confirmatory sample analytical data are stored in the Environmental Restoration project-specific database prior to being submitted for inclusion in the Hanford Environmental Information System database. The confirmatory sample analytical data are also summarized in Appendix B.

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- WCH, 2008, Work Instruction for Confirmatory Sampling of the 300-32, 333 Building Remaining Soils, Work Instruction No. 0300X-WI-G0007, Rev. 0, Washington Closure Hanford, Richland, Washington.
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